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Development of Stratified Systems Theory for Possible Implementation in the U.S. Army

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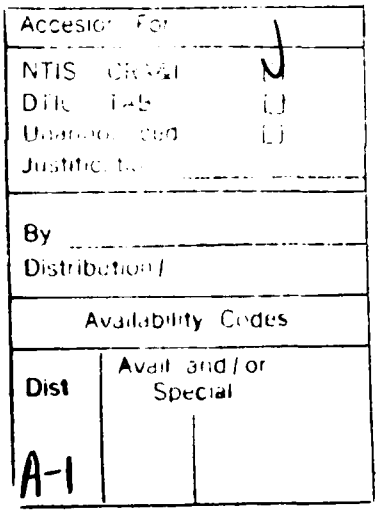

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This report outlines the main features of a 3-year research project to contribute to concepts and principles for leadership and organization in defense forces, with respect both to preparedness in peacetime and to action in combat.

The thrust of the project was to examine the possible consequences for defense force organization and leadership of a new and different conceptual approach, Stratified Systems Theory (SST), to such issues as levels of command organization, creative leadership development, manning, officer efficiency, and information, communication, and control processes, as related to the operational defense force tasks and unit performance.

The program content and outputs included:

- organizational structuring of the Army,
- analysis of the work and development of leadership at senior executive levels,

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19. ABSTRACT (Continued)

- validation and development of the Career Path Appreication (CPA) procedure for assessment of individual capability and potential, and
- consequences of SST for various aspects of the Army's personnel management system.

Accompanying reports include the following:

Assessment of Managerial Potential: Longitudinal Research
Three Studies in Stratified Systems Theory (SST)
Notes on the Development of Stratified Systems Theory and Career Path Appreciation

DEVELOPMENT OF STRATIFIED SYSTEMS THEORY FOR
POSSIBLE IMPLEMENTATION IN THE U.S. ARMY

FINAL TECHNICAL REPORT

1. This report outlines the main features of a three-year research project, running from April 1, 1985 to March 31, 1988. The research was intended to contribute to systems of concepts and principles for leadership and organization in defense forces with respect both to preparedness in peacetime and to action in combat.

2. The particular thrust of the project was to examine the possible consequences for defense force organization and leadership of a new and different conceptual approach to such issues as: levels of command organization, creative leadership development, manning, officer efficiency, and information, communication and control processes, as related to the operational defense force tasks and Unit performance.

3. The orientation of the research was to test the possible value of concepts and procedures from Stratified Systems Theory (SST) in identifying the critical tasks and performance requirements at various levels of military organization and the human capabilities required to satisfy those performance requirements. It was assumed that new ideas and procedures would be developed in the process.

4. Program Content and Outputs

The content of the program tested the possible significance of the above systematic triple-discontinuity theory for Armed Services organization and leadership. Outputs along the following lines were sought:

- organizational structuring of the Army;
- analysis of the work and development of leadership at senior executive levels;
- validation and development of the Career Path Appreciation (CPA) procedure for assessment of individual capability and potential;
- consequences of Stratified Systems Theory for various aspects of the Army's personnel management system.

5. Output

The research has addressed the issues set out in the objectives. There has been progress with respect to the outcomes which were sought, both in terms of work in this final year and in terms of outputs arising from the completion of work which had been initiated in the previous two years' project work.

6. Leadership by Echelon

The concept that the requirements of leadership might differ at different levels was supported by interviews with nine 4-star Generals and 36 3-star Generals by an ARI team in which Dr. Jaques took part. The results of this work were put together in a report by Dr. Jaques,

with Dr. T.O. Jacobs, Dr. C. Rigby and Dr. S. Clement - 'Senior Leadership Performance Requirements at the Executive Level'.

Dr. Jaques collaborated with Dr. Jacobs in the preparation of two documents setting out the leadership requirements at middle and senior levels; namely, a draft of FM22-999, and the draft for DAPAM "DAPAM 167 Executive Leadership".

The technical foundation for these developments was set out in a paper by Dr. Jacobs and Dr. Jaques (1986) Leadership in Complex Systems.

7. Organizational Structure

A number of studies of organizational structure, using the basic concepts of Stratified Systems Theory have been carried out during the period under review. Several of these studies, such as for example, projects in ODCSPER and in conjunction with the DOD reorganization, ran into difficulties and had to be abandoned. A number of other studies, however, have been successfully completed by members of Dr. Jacobs team in the ARI Executive Development Research Group, in which SST concepts have been successfully applied and to which Dr. Jaques contributed.

The most complete description of an SST application to organization development in the Army is to be found in Rigby and Harris (1987) "Program Management Offices: Structural modelling through application of Stratified Systems Theory".

Dr. Jaques has assisted Dr. Jacobs who is currently engaged in institutionalizing the application of SST concepts to Army organization, including the preparation by members of his EDRG staff of a book outlining the technology of SST application.

8. Assessment of Potential of Officers

Dr. Gillian Stamp has brought together the data she has collected over the past 12 years in the course of the development of the CPA procedure (Career Path Appreciation). The data are concerned with the follow-up for periods of four to twelve years of assessments of the potential of officers and managers in the U.S. Army and British Army, and in industry in England and in Namibia. The results show striking correlations of the order of 0.80 to 0.90 between future capability as predicted by CPA and actual capability as shown in later performance. The results are presented in a draft ARI Technical Report by Stamp (1988) under the title "Assessment of Managerial Potential: Longitudinal Research".

In addition, there have been a number of other publications on assessment of potential during the period under review, which have been supported by the project, including:

Stamp, G., (1986) Some Observations on the Career Paths of Women; The Journal of Applied Behavioral Science, Vol. 22, No. 4, pp 385 - 396.

Stamp, G., (1986) Career Path Appreciation and Career Path Mapping; Measurement of Capacity Unit publication.

Stamp, G., (1988) Assessing and Selecting Candidates for Leadership Development; to be published in A Handbook of Leadership Development.

9. Theoretical Developments

There have been substantial theoretical developments underpinning the practical work during this period, as a result of the interplay between studies on the ARI Brunel project and counterpart work which has proceeded in parallel in Jaques' participation in CRA (the Australian mining corporation). Macdonald's work with the British Civil Service Selection Board (CSSB), and Jaques' development of a book on SST for industrial CEOs and managers.

Central to these developments has been the incorporation of concepts of task complexity and of related concepts of cognitive complexity, as the underlying explanation of levels of work and of level of native or potential work-capability in individuals. Hypotheses have been constructed of the existence of qualitatively distinct categories of task complexity to explain the discontinuities in the structure of organizational levels in working organizations. An additional set of hypotheses concerns the existence of qualitatively distinct levels of cognitive complexity in terms of an ascending series of increasingly complex sets used in mental operations - the distinct levels of cognitive complexity being isomorphic with the categories of task complexity.

The initial formulation of these ideas was described in Jaques (1986) "The Development of Intellectual Capability" referred to in previous annual reports. The new concepts, based upon a more highly articulated distinction between task complexity and cognitive complexity, will appear this Fall in the form of three chapters in Jaques (1988) Creativity and Work.

Dr. Stamp has written a short account of the development of some of the main concepts of Stratified Systems Theory, in a paper specially prepared for the ARI project, and herewith appended under the title "Notes on the Development of Stratified Systems Theory and Career Path Appreciation".

Finally, Dr. Jaques has put together the results of three significant research studies applying SST principles, under the title "Three Studies in SST (1988, appended herewith). The three studies comprise:

- Work by Roy Richardson at Honeywell Inc., confirming the link between time-span measurement of felt-fair pay, and published as Richardson (1971) Fair Pay and Work.

- Doctoral research carried out by Dr. Edna Homa at the Harvard Business School, showing a significant regularity in individuals' conceptions of their likely rate of growth in capability as shown in their sought after rates of growth in real earnings. This regularity is similar to that postulated by Jaques in his array of cognitive growth curves. This research was published (1967) as a doctoral dissertation entitled "The inter-relationship among work, payment and capacity".

- The third study was carried out by Dr. T. Kohler who showed that individuals are most comfortable with progressions in level of work which conform to the SST cognitive progression curves.

These studies taken together, constitute supporting evidence for the main concepts underlying Stratified Systems Theory.

10. The members of the Brunel project research staff wish to express their warm thanks for the support given them by ARI throughout this research.

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Appendix A

ASSESSMENT OF MANAGERIAL POTENTIAL: LONGITUDINAL RESEARCH

Introduction

The primary purpose of this paper is to present long-term follow-up of predictions of individual differences in the potential to carry responsibility for work at different levels of complexity within organisations. The significance of predicting potential -- especially in a rapidly changing world -- can be simply stated: People represent a significant short- and long-term investment for the organisation of which they are a part. Accurate evaluation of the rate of appreciation of that investment ensures effectiveness of the organisation, considerable financial savings and, not least, dignity for the individuals concerned. For example, if an organisation is likely to be called upon to meet new challenges, an accurate picture of the current state of the potential of its human resources and of the rate at which they are likely to grow is essential if the challenges are to be met.

Section 1: Predicting Potential

a. Meta-analyses

1. In the last twenty years there has been a very substantial number of studies of potential. One of the best known is Bray's work with AT&T (Bray and Grant, 1966, Bray, Campbell and Grant, 1974). Two recent articles provide meta-analyses of the results of many investigations of these studies (Schmitt, Gooding, Noe and Kirsch, 1984; Hunter and Hunter, 1984). The implications of these studies for practice in the U.K. are examined by Herriot (1987).

In broad terms the meta-analyses are concerned with the relationship between procedures for predicting potential and criteria for evaluating success. The procedures which are most widely covered in the analysed literature are tests of cognitive ability, work samples, (of which job knowledge may be a sub-set), assessment centres, biographical data, personality tests, interviews and references. The most commonly used criteria are training success and job proficiency -- the latter evaluated by ratings or rate of promotion and measured by productivity or salary.

A quick overview of the validity coefficients of five of the studies of procedures for predicting potential covered in these papers is summarized in Table 1.

Table 1

Summary of Five Studies of Validity Coefficients of Procedures for Predicting Potential

Predictors	Herriot (1987)	Dunnette (1972)	Reilly & Chao (1982)	Hunter & Hunter (1984)	Schmitt (1984)
Cognitive ability	.27	.55[a] .45[b]	-	.53	.248
Work sample	.38	-	-	.44	.378
Job knowledge	-	.51	-	.78[c]	-
Biographical data	.24	.34	.38	.37	.243
Assessment centres	.41	-	-	.63[d] .33[e]	.407
Personality tests	.15	-	-	-	.149
Interviews	.14	-	.23	.14	-
References	-	-	.17	.26	-

a. Training success.

b. Job proficiency.

c. Trained subjects.

d. With promotion.

e. With job proficiency.

b. Comment on Procedures for Predicting Potential

It will be clear from Table 1 that assessment centres offer predictions with the highest validity; but hunter and Hunter (referring to Cohen, et al., 1974) point out that the correlation of .63 is with promotion. There is a much lower correlation (.33) with actual performance. The findings on tests of cognitive ability as a predictor are also not clear cut; Schmitt (1984) suggests that the lower validity in his studies may be accounted for by the fact that Hunter and Hunter had access to extensive unpublished materials. It is also of interest that tests of cognitive ability offer a correlation of .55 with training success yet only .45 with job proficiency.

The relatively high validity of biodata as a procedure prompts Hunter and Hunter to comment that its accurate use requires a large sample. They refer to one consortium where a Supervisory Profile Record (SPR) has been developed from a data base with input from thirty-nine organisations. The validity of the S.P.R. for predicting supervisory ratings is .40, with no variation over time and little across organisations (Hunter and Schmidt, 1975, pp 1067-1068).

As far as job knowledge is concerned, Hunter and Hunter (1984) point out that, despite their high validity, the use of job knowledge tests is limited by the fact that they can only be used for prediction if the employees (or subjects) have already been trained for the job.

Schmitt (1984) and Asher and Sciarrino (1974) draw attention to the relationship between the procedures for predicting potential and the criteria used for evaluating success. Schmitt (1984) refers to the general concern that criteria should be as objective as possible; but points out that, in the studies that he and his colleagues analyzed, criteria tended to fall into two broad categories -- training success and job proficiency. As outlined above, the latter may be rated by immediate supervisors or measured by output, sales, salary, or rate of promotion.

c. The Relationship between Procedures for Predicting Potential and Criteria

In considering the relationship between procedures and criteria, Schmitt (1984) follows Wernimont and Campbell's (1968) suggestion that development of procedures intended to be actual job samples should result in increased validity coefficients. Behavioural consistency theory suggests that the closer one can come to getting some measure or indication of performance on samples of work activities that people might be expected to perform in a job, the better predictions one would be able to make of the actual performance of individuals on the activities in question.

More technically, if predictor and criterion measures fall within the same content domain, the validity of correlations should be maximized. Schmitt et al. (1984) implies that the question of content domain

underlies the validity of work samples or job try-out as good procedures for predicting job proficiency (see Schmitt et al., 1984, p 417 for a summary table of average validity coefficients for predictor-criterion combinations; see also Bray, et al., 1966).

The importance of procedures for predicting potential and criteria of success being within the same content domain is underlined by Anstey in his paper on the thirty year follow-up of the Civil Service Selection Board (CSSB) procedure in the United Kingdom (Anstey, 1977). In describing the procedure, Anstey makes it clear that the original CSSB techniques were based on careful analysis and modelling of the work of senior administrators. There is a suggestion that that is one of the reasons why the Civil Service obtained probably the highest ever validity coefficients for high grade selection in any country.

One of the overall conclusions that can be drawn from these summaries of studies of predicting potential is that the most effective procedures for predicting job proficiency at some future date are those which sample the work which is actually going to be undertaken either in the immediate or the longer-term future. This conclusion points to the importance of the content validity of the tests or situations designed to elicit the behaviours used as indications of potential.

It is, however, not possible to devise effective work-sampling procedures until there has been a thorough analysis of the work to be done. Hunter and Hunter (1984) suggest that the validity of work sampling as a procedure could be enhanced if it were integrated with other procedures with a reasonably high validity (tests of cognitive ability and biodata) (see Hunter and Hunter, 1984 re. alternative predictors and Anstey, 1977 re. integrating rather than adding).

d. The Contribution of Theory

Behind content validity, there is the question of construct validity -- the theoretical underpinning of the procedures for predicting potential, the criteria for evaluating success and the relationship between them (see, for example, Stewart and Stewart, 1977 and Guion, 1987). At minimum, construct validity would (a) enhance content validity by providing a definition of work which, by explicating the nature of the predictor, would make it possible to design more effective procedures for prediction; (b) bring predictors and criteria into a common content domain and (c) provide an explicit statement about adult development and individual differences.

The meta-analyses tend to suggest that, apart from the concept of cognitive ability, the predictors underlying the procedures are largely implicit and not clearly defined. It is the procedures for predicting potential rather than the predictors which are offered as hypotheses for testing.

A common assumption in assessment and prediction is that adults do develop; and, further, that they develop at different rates. In some assessment settings these assumptions are made manifest in the form of

a Minimum Development Curve based on organizational structure and time constraints. For example, in the United Kingdom Civil Service, a graduate administrative entrant with a mark of 3 is predicted to be able to work as a Principal within five years of entering the service. This prediction in time is relative to entrance and does not refer to the age of the candidate.

In the absence of an explicit hypothesis about adult development and differences in rate of growth, assessment procedures are designed on the basis of statistical models. Tests and techniques are retained if the correlations are good enough and there is little impetus for review.

The requirements for construct validity are met by Stratified Systems Theory which provides the base for the development of the procedure for predicting potential described in this paper.

Section 2: Stratified Systems Theory

a. Definition of Work

Stratified Systems Theory (SST) (see Jaques, 1975, 1982 and Evans, 1979) provides a definition of work -- "The effort to accomplish a goal requiring the exercise of discretion within prescribed limits and within a stated completion-time". The theory postulates that the core of the psychological experience of doing work is "the exercise of discretion".

The prescribed limits are the rules of the organisation in the form of policies, procedures, physical controls, signals and other types of control which are objectively set. In short, these controls may be taken as an indication of the things that must be done. They state the boundaries of the work and define the scope of the discretionary environment.

By contrast with the things that must be done, the exercise of discretion is concerned with the choices that must be made. The word "discretion" comes from the past participle of the verb "to discern", i.e., to distinguish, to separate apart. The word "discretion" was chosen to convey the psychological process of mulling over a number of courses of possible action which could be used to reach a goal, reaching into the self to choose those (or the one) which are/is most likely to reach the goal; then acting on that choice. In other words, the exercise of discretion may be thought of as the imagination, formulation and execution of a course of action which is not prescribed. One of the characteristics of discretion is that, to the extent that the person is capable of making the choices that must be made, s/he will not perceive that discretion is being exercised.

b. Levels of Work

In addition to the core definition, the theory provides a model of how work is structured in levels of increasing complexity within the organization in order to take account of the complexity of the environment (see Table 2). It follows that the scope of discretion must increase at higher levels because the increasing complexity prohibits the formulation of precedent, procedures and rules.

This complexity can be measured by considering the shortest time period that can elapse in order to obtain feedback about choices made. This is the minimum time that must elapse before it is clear that the choices made about courses of action have not been adequate to the complexity of the environment. The consequences of grossly inappropriate choices will become apparent fairly quickly, but it may be months or even years before the consequences of marginally inappropriate choices become manifest. From this perspective it is possible to rephrase the definition of work given above and to redefine work as "effort to realise purpose in practice and to review practice in the light of purpose".

Table 2

Levels of Work in Civilian and Military Organizations

Level of Work	Time-span		Description	Civilian Organization	Military Organization
VII	50 yrs.	strategic	Strategic design, development, deployment of complex systems	Corporation	MACOM Army Board
VI	20 yrs.	strategic	Direct deployment of complex systems	Group	Corps
V	10 yrs	comprehensive	Complex systems, encompassing operating systems and modifying context	Subsidiary	Division
IV	5 yrs.	comprehensive	Alternative operating systems -- general management	General Management	Brigade
III	2 yrs.	operational	Direct operating systems -- management of a mutual recognition unit	Unit	Battalion
II	1 yr.	operational	Direct operating methods -- supervision of a mutual knowledge system	Section	Company
I	3 mths	operational	Direct operating tasks.	Shop Floor	Squad

Because the measurement of level of work refers to the time scale of review of the exercise of marginally substandard discretion, the measurement tool is called "the time-span of discretion".

c. The Array of Growth Curves

The theory also includes a description of how work is experienced by the person engaged in it -- of how the exercise of discretion actually feels -- and an explicit hypothesis about rates of growth of the individual capacity to exercise discretion; and, therefore, to do work at levels of increasing complexity.

This hypothesis is presented in the form of an array of growth curves which follow the sigmoidal progression characteristic of biological growth. The array was derived originally from studies of individual earning progressions of five hundred and twenty people and subsequently tested with a further three thousand cases (see Jaques, 1968). Jaques (op. cit.) then constructed the hypothesis that the regularity he had charted in individual earning progressions reflected growth in the person's capacity to cope with work of increasing complexity. The array of curves thus represents statistical facts about pay and an hypothesis about regularity in rate of growth over time of the capacity to exercise discretion.

The relationship between the levels of work of increasing complexity and the array of growth curves is illustrated in Figure 1 where the growth curves are grouped into modes, each mode including all curves which reach a maximum point of development in the same level of work.

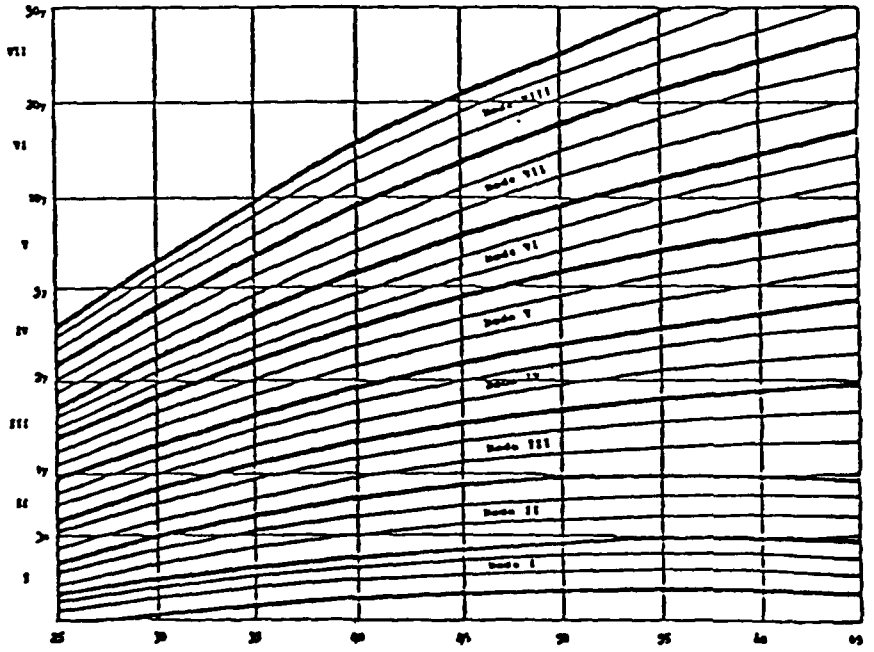


Figure 1

Levels of Work and the Array of Growth Curves

By providing a definition of work, SST (a) enhances content validity and allows effective work-sampling; and (b) brings predictors and criteria into a common content domain. By offering an explicit hypothesis about rates of growth of the capacity in adults to exercise discretion, (and, therefore, to do work) the theory establishes a relationship over time between specific predictors and particular criteria. For example, the theory makes it possible to predict how long it will be before a particular person is likely to be capable of exercising discretion and doing work at a particular level. Finally, the theory offers the hypothesis that growth in "the capacity to exercise discretion" is expressed in "the capacity to cope with complexity".

Section 3: The Procedure for Predicting Potential and the Criterion

The studies of prediction of potential were undertaken in four very different settings which will be described in detail in Section 4. Briefly they are a multinational oil company, a multinational engineering company, a national fertilizer company and a British-owned multinational mining company operating in a developing country.

a. Development of the Procedure

In each setting the procedure used was an evaluation of the current scope of the person's capacity to exercise discretion or cope with complexity -- in other words, his or her "current level of capability," defined as "the person's capability at a particular age to generate and to respond to complexity within the world, within him/herself and in the constant work needed to keep both in equilibrium".

In the early stages of the research, the evaluation of current level of capability was made by means of an extended interview which was based in the definitions and models of Stratified Systems Theory. By 1979 the interview had been developed into a procedure called "Career Path Appreciation".

Starting from the idea that, from a psychological perspective, work is discretion realized in action, we decided to design a procedure which would allow us to observe the person at work. The definition of work provided the basis for the content validity of the procedure which may be thought of as work sampling -- not in the concrete sense, but in the sense of observing how discretion is being exercised -- or, in other words, how the person is coping with complexity. The handling of complexity is a generic component of work at all levels. The predictor is, therefore, tapping a universal component which is hypothesized to be highly related to advancement.

Because we wanted to set up a microcosm of the psychological experience of doing work, we decided not to use general tests of ability. These are good predictors of crystallized intelligence and achievement in education and training settings. But we felt that they were less likely to predict the fluid intelligence which we assumed to be closer to the idea of realizing discretion in action. We also thought that general tests of ability were more likely to reflect "static" individual differences rather than the growth in individual capability which we sought to predict.

In parallel with Jaques' early work on the exercise of discretion, Isaac and O'Connor (1969, 1973) had been engaged in experimental, statistical studies of judgment in action. Building on their work (Isaac and O'Connor, op. cit.) we decided to start by using a task which came originally from the concept formation literature (see Bruner, 1966). Because we were not trying to measure the ability to learn, but to observe judgment or discretion in action, we decided to give only minimal instructions to the respondent and not to offer rehearsal.

The task required the respondent to discover and implement a predetermined sorting rule. Cards carrying a symbol or combination of symbols which vary in colour, number, size and shape, were provided. In the pack overall there are three colours, three numbers, three sizes, and three shapes. At the beginning of the task four display cards were set out. Three of these illustrated various combinations of the four factors, and the fourth was blank. The respondent was given a pack of 162 cards, each carrying a different combination of the four factors.

The respondent was asked to place each card below the display cards in such a way that they corresponded with a pre-set order. The goal was to place ten consecutive cards correctly, but there were no restrictions on time or number of cards. To enable solution, the administrator gave the following information: In the case of the three cards displaying symbols, the respondent was told whether or not the placement was correct. In the case of the blank card, no feedback was given.

At the end of this task the administrator initiated a very brief discussion with the respondents about their current work, the history of their careers and their aspirations for the future.

With this procedure it appeared to be possible to elicit enough information about the respondents' characteristic patterns of realizing discretion in action to evaluate each person's level of capability -- thus, the level of work at which s/he would currently be effective. In the very early stages of the work this evaluation was checked against the level of work at which the respondent was actually employed. Although no formal correlations were made, the degree of correspondence was deemed satisfactory.

If the evaluation of current level of capability at a particular age is set against the array of growth curves (see Figure 1), it includes a prediction about the likely current level of capability at any given time in the future. At this stage of the development of Career Path Appreciation, the predictor (the evaluation of current level of capability) was made on the basis of information elicited in this way.

In the course of analyzing the interview protocols and, in particular, comments elicited by respondents about the way they had constructed and tested strategies, it became clear that a further important source of information about characteristic patterns of realizing discretion in action lay in these comments.

Out of more than a hundred phrases taken from protocols of the symbol card task, 54 were chosen for a final pack of phrase cards. They were chosen because, in the course of testing the hundred, these emerged as the phrases which were most open in the sense that they could be given a wide range of interpretations according to the understanding of the respondent. As a consequence, these were the phrases which consistently elicited the fullest discussions about the way that each respondent approached his or her work. The 54 were arranged in nine sets of six and added to the extended interview by giving them to the respondent before the symbol card task.

The enhanced understanding of the respondent's patterns of realizing discretion afforded by these phrase cards, and the evident reflective enjoyment and insight they gave, warranted their inclusion in the procedure. There is no attempt to score respondents' comments about the cards; comments are analysed for content in the light of the model of levels of capability (see Table 3).

During the same period it became clear that more information would be available to the administrator (and to the respondent) if the career interview was more structured. We therefore decided to ask the respondent to talk about times when s/he felt that there had been a good correspondence between their own capacity to exercise discretion and the work for which they were responsible, times when they felt they had been overstretched and times when they felt they had been underused.

Once the phrase cards and the more detailed work history had been tested and added to the extended interview, it became clear that what had been developed was a procedure which makes it possible for the respondents to put their characteristic strategies and feelings about work into words for the first time. An almost universal response to an Appreciation is the comment "I have never thought about my work like this before". At this point the procedure was named Career Path Appreciation.

At the beginning of the Appreciation the respondent is offered each set of phrase cards separately and asked to choose the card which s/he feels reflects most closely the way s/he would approach a piece of work. Respondents frequently comment on more than one card, or may choose to put the cards in some order or to put aside those which they feel do not relate in any way to their own approach to work. The Appreciation then moves on to the symbol card task, the work history and a discussion about the respondent's aspirations for the future of his or her working life.

The symbol card task and the phrase cards are both open to the strategies and interpretations the respondent wishes to place on them. For example, respondents will frequently say "I take it that this card means ....". It is not usually necessary for the administrator to reply; but, if it is, an indication will be given that the respondent is free to give their own meaning to the phrases. Further, the tone of the Appreciation is such that the respondent is encouraged to bring to bear rational, analytic competence and the mulling and separating apart which is the core of the exercise of discretion.

Career Path Appreciation is a procedure that allows a particular kind of work-sampling. The nature of the procedure is such that it creates a shared setting in which the respondent can play out the characteristic ways in which s/he works. In this setting internal resources on which respondents have been drawing to do their work become part of the shared experience of each respondent and administrator. In becoming spontaneously aware of these resources, the respondents increase their skill for tapping them in the future. The administrator can also draw the attention of the respondent to these internal resources so that they may be further explicated.

Table 3

The Eight Levels of Capability

VIII	Transforming: the international and/or national context and create alternative social institutions.
VII	Extrapolation: from contexts at stratum VI and create connections which can sustain the formation and development of stratum V institutions initiated at stratum VIII.
VI	Defining: generate a range of perceptions of complex stratum V systems and shape the social, political and economic contexts in which they operate. Construct the future rather than forecast it.
V	Shaping: make relationships between previously unrelated material; create general rules and redefine fields of knowledge and experience. Engage with an open context and decide when it should be closed; operate a complex five stratum system, modify its boundaries and cope with second and third order consequences which arise. Elements explicitly seen as interdependent; to change one part is to change the whole.
IV	Transforming: retain contact with what currently exists and detach to conceptualise something completely different -- not a modification but a point of departure. Contrast and compare alternative operating systems and alternative modes of deploying or modifying them. Maintain a patterned structure within which hypotheses are tested.
III	Extrapolating: extrapolate from given rules and handle ambiguity by creating new connections within a defined system. Mould operating tasks and operating methods into a system of direct work and fine tune that system to cope with changing trends.
II	Defining: generate different perceptions of a given situation; organise perceptions in alternative ways; handle ambiguity by polarising. Put together a programme of direct operating tasks in order to accumulate knowledge about their aggregation and to change programmes in the light of the given situation.
I	Shaping: see the world through a few focussed dimensions and engage directly with physical objects or serve people one task at a time.

In summary, Career Path Appreciation is a procedure which allows (a) interpretation of the present relationship between the respondent's current capacity to exercise discretion and the work for which s/he is responsible (b) consideration of the history of that relationship (c) consideration of the likely future of that relationship; and, for the respondent (d) awareness of the internal resources s/he has been drawing on to do work.

An Appreciation is concerned with the working life as the relationship between the person and the organisation(s) in which s/he is employed. Lofland and Lofland's (1982) description of the intensive interview as "a guided conversation which seeks to elicit materials of substantial depth for use in qualitative analysis" is a useful way of thinking about an Appreciation.

b. The Criterion

In each case the criterion used was the level of work at which the subject was employed at the time of follow-up. This criterion requires some comment: The first point is that it is related not to training or to predicted rate of promotion, but to actual performance for which the employing organization was prepared to pay a salary.

Secondly, ideal conditions would have allowed measurement of level of work by means of the time-span of discretion. Unfortunately, ideal conditions did not prevail, and such accurate measurement was not possible. But, in the oil and the fertilizer companies, it was possible to use time-span and accurate descriptions of levels of work to match the system for describing levels of work in use in those companies (Hay MSL) with the model as defined by SST. In the engineering company and the mine, work was structured in terms of the model.

The levels of work as measureable in time-span and as described in SST are illustrated in Table 2.

Section 4: The Four Settings in which Data were Collected

As indicated above, the studies were undertaken in four very different settings. Each company is described in detail in order to emphasize the very considerable differences in the settings. The differences are in scale of the organization, type of activity, economic and social climate in which it is operating, and the ethnic backgrounds of employees. Each of the four companies conducted its own study of the predictive power of Career Path Appreciation, and these are described in the section on the company.

a. The MultiNational Oil Company (84 respondents followed up)

The original work was done in 1974 at the request of the personnel department which felt that there was considerable common ground between the approach made possible by SST and their own procedures for identifying potential.

In the ten years that elapsed since the original evaluations of current level of capability of the respondents and the follow-up in terms of the level of work at which they were employed, this company had to adopt a more entrepreneural style and to manage the consequences of nationalization of a number of operating companies in developing countries.

1. The Study Undertaken by the Oil Company

The original study in 1974 included 100 respondents, and it was agreed that there would be no follow-up of specific individuals. In 1984 the company decided that it would undertake a follow-up study. It was able to trace 84 people still in its employ. Eighty-two of these were men and two women. All were of Anglo-Saxon origin. Since the study was done purely for research purposes, access to the original judgments was restricted to one person and to his successor in the personnel office.

This part of the sample represents the earliest stage of the development of the predictor -- that is to say, the extended interview, including only the symbol card task and a brief career history used to elicit the material on which the evaluation of current level of capability was made.

When the company did the follow-up study, they did not appreciate that the evaluations made were explicitly of current level of capability, but that they carried an implicit prediction of potential. Accordingly, their correlation on the full sample was between the explicit predictor, that is to say, the evaluation of the current level of capability at the initial interview and the level of work achieved nine years later. Four outliers were removed because both the personnel director and senior managers judged these people to be out of the ordinary. The correlation between predicted and achieved scores was .71. The company commented that the predictive validity of psychological testing is usually reported as much lower than this, below say .45 (see Table 1).

A correlation was also done specifically on those members of the sample who were under 35 at the time of the Appreciation. For that group the correlation between predicted and achieved level was .84.

In completing the study reported here, results of the original evaluations made for each respondent (including the four outliers) were extrapolated along the appropriate curve for nine years, and that position then correlated with the level of work at which s/he was employed in 1984. That data is presented in Table 4. The correlation between predicted and achieved level was .70.

In view of the fact that there can be no follow-up of specific individuals, it is possible to note only that there appears to be a tendency for people of more limited potential (in terms of the predictor) to be employed at higher levels than would be expected. Informal comment from the company suggests that a possible explanation could be a recognized tendency to overvalue operational skills.

b. The Multinational Engineering Company (35 respondents followed up)

In the course of the period of the follow-up study, this company has had to face a decline in heavy engineering in the United Kingdom, but it was subsequntly involved in extensive developments outside Europe, building an international reputation in high-tech engineering. Then in 1986 it was taken over by a rival.

Among the respondents followed up in this company, 5 were originally interviewed between 1974 and 1979 before the refinement of the procedure and 30 between 1979 and 1983. The respondents included actual graduates and those selected for an MBA course. Thirty are men of Anglo-Saxon origin and one is a woman.

The work had the dual purpose of research and application. The evaluations of current level of capability and the prediction of rate of growth were available only to the personnel director; they were not disclosed to the respondents or to their line managers. After 1979 the evaluations were made by two administrators working independently.

Since there were only 35 respondents in this company, they were included in Table 5 which displays all respondents. Those interviewed in or after 1979 are in Table 6.

1. The Study Undertaken by the Engineering Company

In 1987 the personnel director decided to undertake his own follow-up study on 30 people interviewed between 1976 and 1984 on whom there was sufficient information for him to judge that they could be used as a sample to test the predictive power of the procedure. Because he included an additional year in his study and because he chose to follow-up only those on whom he could gather more detailed information, 24 of his subjects are the same as those of the authors, and 6 are graduates originally interviewed in 1984.

This group is all male. Twenty-six of the 30 (86.7%) are working capably at the level predicted; two are over-performing by one level (one of these has just been declared redundant) and two are under-performing.

The underperformers are described in the following cases:

Case 1: A 39-year-old metallurgist and licensed engineer. Undoubtedly intelligent but rather a negative character; seems to exhibit a lack of drive; obtained specialist MSC and generalist MBA degrees; operating in specialist metallurgical field.

Case 2: A 36-year-old computer specialist. Has started two degree courses but finished neither altho h has the intelligence to do so.

c. The Fertilizer Company (38 respondents followed up)

In the period covered by the study this company has faced very considerable difficulties, and a substantial number of its employees have left or have been declared redundant. The company operates in a declining field and is subject to powerful environmental lobbies. Despite these difficulties, the company was bought in 1982 by a Norwegian company who invested heavily in a new plant located in the Northeast of the United Kingdom.

The earliest work in this company was done in 1976 and the bulk in 1977 as the procedure was being refined by the addition of the phrase cards and a more structured work history interview. All the respondents were male and of Anglo-Saxon origin.

The evaluations were all made by the author as part of an extensive procedure. They were not fed back to the respondents or to their managers nor (because of the circumstance described above) were they used for career planning or individual development.

The follow-up study included interviews with 38 (61.3%) of the original respondents. In each case the criterion used was the level of work at which they were employed in 1987 or the level at which they were employed when they left the company if that was more than four years after the original interview. Because there are only 38 respondents in this company they are included in Table 5.

1. The Study Undertaken by the Fertilizer Company

In 1981 two members of the company personnel department decided to make a study of the methods of identifying potential used by the company between 1976 and 1981. Since they were looking for an immediate answer on predictive value, they could neither lock away the data nor wait for time to elapse. An alternative method was used. A small team from the personnel department considered each person for whom the data existed and subjectively assessed the highest level in the organization that they were likely to reach if there were no constraints on promotion, and

ability alone were the criterion. Each person was considered, and the sum of the information available from the sources listed below was weighted and assessed:

(1) level already achieved; (2) tests (the AH5 group test of high grade intelligence, the Watson Glaser Critical Thinking Appraisal, the Kostick Perception and Preference Inventory, the Fineman Self-Description Inventory Work Preference and Job Climate questionnaires, an Assessment Centre rating; (3) career development interviews; (4) job performance (judged by the immediate manager and more senior managers).

Individuals were then assigned to the highest level of work at which it was considered they had the potential to perform competently. That level was called "Considered Potential".

Considered Potential assessments were made on 223 people. All the available data were correlated with Considered Potential and the correlation between the company's rating of Considered Potential and the level of work (predicted by the extended interview which preceded the fully developed Career Path Appreciation) was .73.

The company concluded that the evaluation of potential capability (which they saw as independent of organisation culture) was a most powerful and reliable method for informing decisions involving assessment of managerial potential.

d. The Mine in a Developing Country (25 respondents followed up)

This company in Africa describes itself as "A First World company using First World technology, competing in First World markets with a First World product, but located in a Third World country."

The management of the mine is committed to the development of indigenous staff, and the original invitation to work with them was specifically on this group. The work started in 1982, and the follow-up reported here was done in 1986.

Of the 25 respondents, 17 (15 and 2 women, or 68%) are members of the indigenous population which is tribal, predominantly pastoral and of limited education (only 6 respondents (24%) have been educated beyond primary school level. The other 8 (32%) respondents are men of Anglo-Saxon origin.

The evaluations of the current level of capability of the 17 members of the indigenous population have been used to plan training and individual development. Evaluations on the other 8 have not been so used. Because follow-up data is available for only small numbers at the moment, all 25 are included in Table 6. When further and more detailed information is obtained, the data derived from cases where the judgments have been used will be presented separately.

Preliminary analysis of follow-up studies of 92 more employees at the mine is presented in Section 5. More detailed analysis of the data will be completed by the Spring of 1988.

1. The Study Undertaken by the Mining Company

In 1985 the personnel manager of the mine was asked to present a paper on the prediction of potential at an international company conference. In the paper he spoke of the need for the management of the company in the future to come from the indigenous people and of the difficulty of developing people in a country with a poor education system which does not provide a foundation of recognized and reliable criteria of individual assessment.

He outlined the way in which Career Path Appreciation had been used for individual development and departmental restructuring, and concluded that "the major benefit of using Career Path Appreciation is that it works. It does actually give you an accurate prediction of a person's performance potential for the future. We estimate a probability of success of .8, climbing all the time. The second benefit is that it is understood and confirmed by the individuals being assessed. The third benefit is that it is more cost effective."

Section 5. Results and Interpretation

a. The Sample

The full sample now consists of 274 people. But, in this section, the predicted and achieved levels of only 182 people are displayed in scattergrams and fully analyzed. The details of the data on the other 92 members of the sample have not yet been fully analyzed; but some trends are evident in a cursory examination of the data.

Within the sample, educational qualifications range from doctorates to primary school certificates; the age range is from 21 to 55. Respondents were currently employed at Levels I, II, III, IV, and V; 5.4% are women; and 21% black or brown Africans. Finally, the settings in which the respondents were employed are significantly different from each other (see Section 4).

Members of the sample were followed up over periods ranging from 4 to 13 years. The cut-off point of four years was chosen because, that seemed the minimum necessary to indicate and established trend.

b. The Data

1. The Group of 182 People:

In presenting the data on this group, it was decided that a correlation of the relationship between predictor and criterion on all 182 would be made because that would include the longest period of follow-up. But it was also decided to do a correlation between predictor and criterion on the 76 respondents where the predictor was the refined procedure of Career Path Appreciation.

The data are presented in scattergrams where the actual level of work at which the respondent was employed at the time of follow-up is plotted on the vertical axis and the level predicted by the extended interview (from 1979, the Appreciation) on the horizontal axis. In order to add to the interpretation of the scattergrams, a matrix of levels of work has been superimposed.

Five levels of work -- each divided into high, mid and low -- are plotted on the vertical axis. Each level of work is assumed to require in the individual a current level of capability (scope of exercise of discretion) which can generate and respond to the complexity of that level. Each corresponds to a commonly used category of management.

Level I is nonmanagerial work with a time-span of up to three months. None of the long-term follow-up sample remained in this level. Level II is first-line management/first level specialist work with a time-span of three months up to one year. Level III is middle management/principal specialist work with a time-span of one year up to two years. Level IV is senior management/strategic staff work with a time-span of two to five years. Level V is senior executive management of strategic business units with a time-span of five years up to ten years, and Level

VI is multinational corporate work with a time-span of ten years up to twenty-five years (there are only two bands marked within this level).

The horizontal axis represents the level of work which the respondent would be expected to be able to handle in the light of the original evaluation of current level of capability and the slope of the growth curves; each level is similarly divided into high, mid, and low.

Table 4 displays data on 84 respondents from the multinational oil company who were followed up after 9 years. The correlation is .70. It will be recalled that this table includes four outliers excluded in the company's own follow-up study, and that it is an extrapolation over 9 years.

Table 5 displays data on 182 respondents who were followed up over periods ranging from 4 to 13 years. It will be clear from Section 4 that the group includes men and women from different cultural backgrounds. Some are educated to the Ph.D level, and there are some who left school at age 11. With regard to the correlation of .79 obtained from this data, it is important to note that the data include evaluations of current and future level of capability made in the earliest stages of the research and development of Career Path Appreciation.

Table 6 displays data on 76 respondents who were followed up over periods ranging from 4 to 8 years; that is to say, respondents for whom evaluations of current and future level of capability were made by using the refined procedure. The correlation of .89 is assumed to indicate the effect of that refinement.

Table 7 displays data on 59 of the respondents included in Table 6. The 59 are those who remained in the employment of their organization. It will be noted that the correlation here is .92. Examination of Table 7 and Table 6 shows that, of the 17 who left, 13 were, in terms of predicted rate of growth, under- or over-used.

2. The Group of 92 People

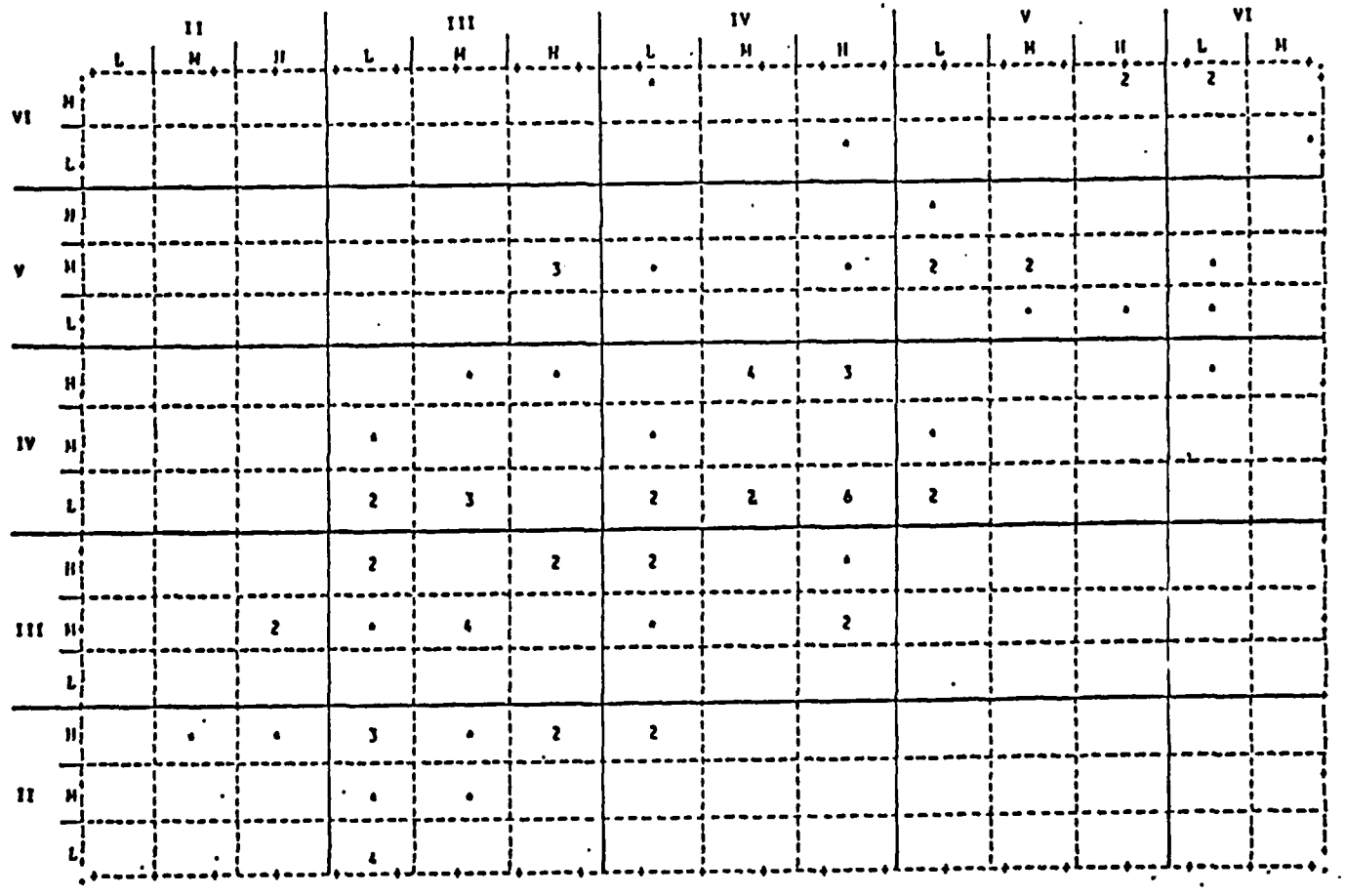
The data on the other 92 members of the total sample have not yet been put into tabular form. These people are all employees of the mining company in a developing country. The material is of particular interest because of the heterogeneity of the sample in terms of race and education.

Thirty-four people are of Anglo-Saxon origin (36.9%); 58 are black or brown Africans (63%). Eighty are men and 12 are women. Of the 58, 17.2% are university graduates, 15.5% had completed secondary school, 15.5% had completed three years or less of secondary school, and 51.7% had no education beyond primary school.

In each case the procedure for predicting potential was a Career Path Appreciation. The evaluation of current level of capability was used to plan individually-tailored training programs and opportunities and to predict a comfort curve. An individual's comfort curve represents (or

Table 4

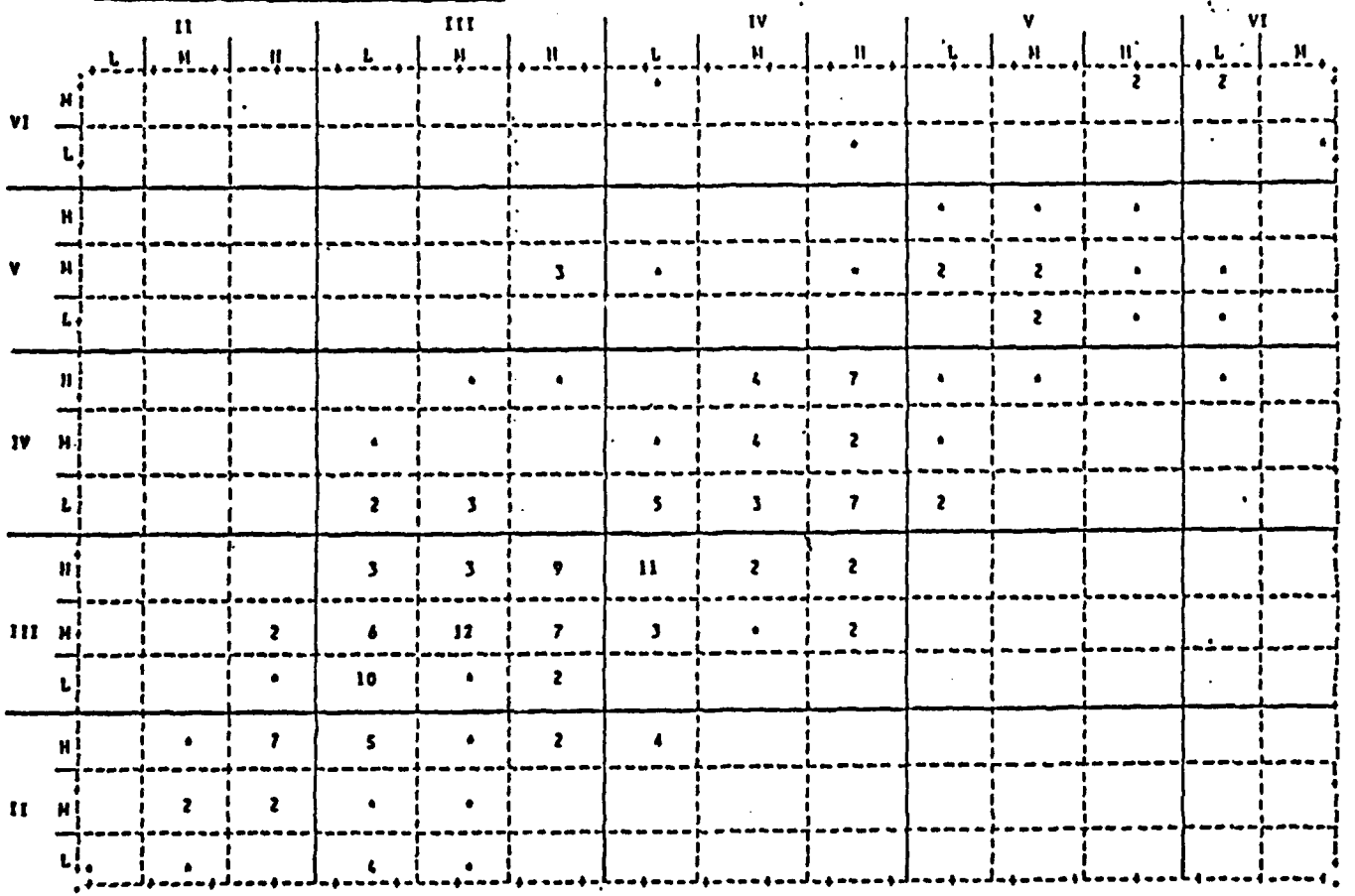
Follow-up on 84 respondents (Multinational oil company)



Correlation (R)	0.70628	R^2	0.49883	Significance	0.00000
Std Err of Est	2.43071	Intercept (A)	1.19894	Slope (B)	0.82705
Plotted values	84	Excluded values	0	Missing Values	0

Table 5

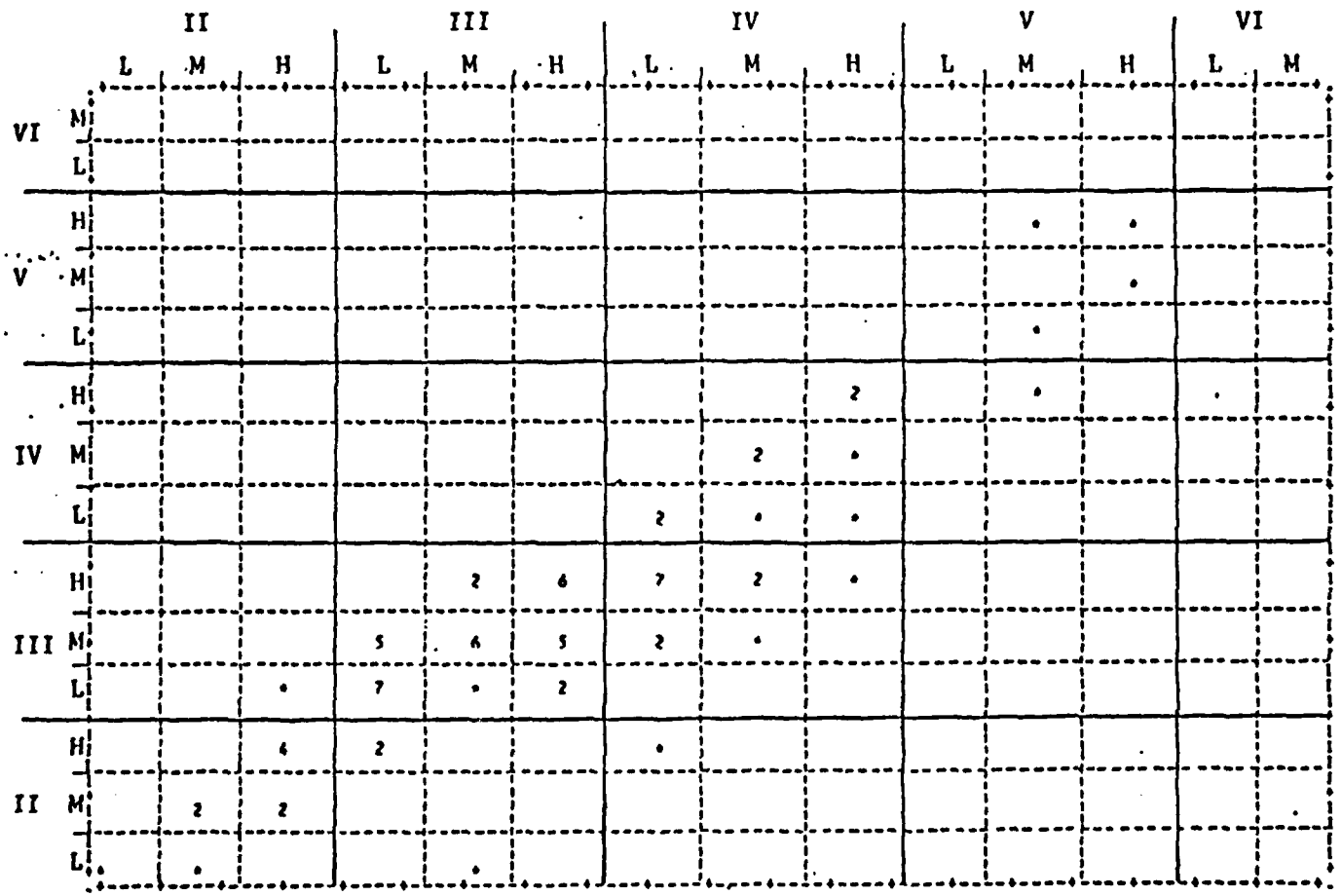
Follow-up on 182 respondents



Correlation (R)	0.79226	R^2	0.62767	Significance	0.00000
Std Err of Est	1.81508	Intercept (A)	0.56695	Slope (B)	0.86941
Plotted Values	182	Excluded Values	0	Missing Values	0

Table 6

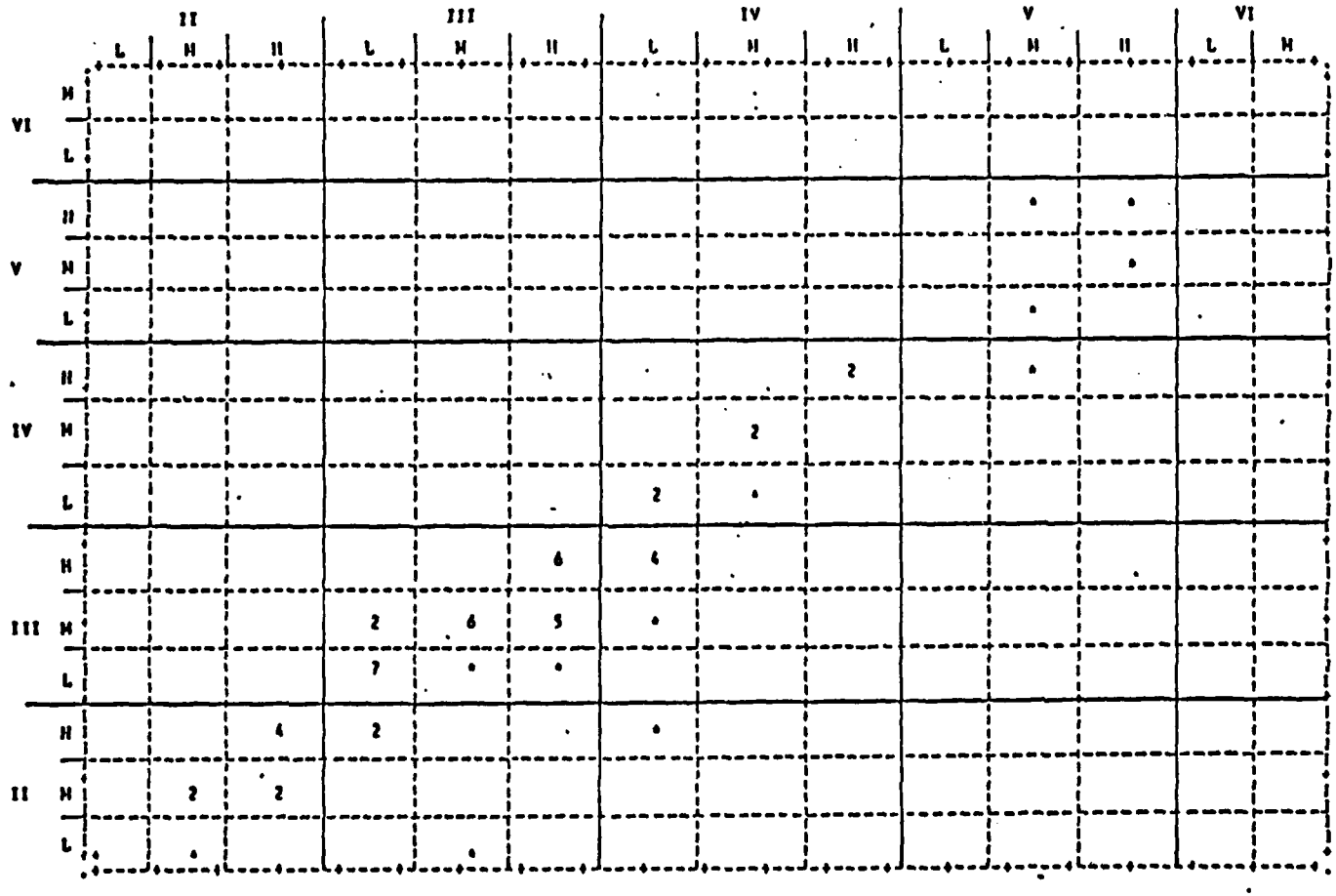
Follow-up on 76 respondents



Correlation (R)	0.89224	R^2	0.79610	Significance	0.00000
Std Err of Est	1.02868	Intercept (A)	0.34672	Slope (B)	0.84451
Plotted values	76	Excluded values	0	Missing values	0

Table 7

Follow-up on 59 respondents (Table 6 minus those that left)



Correlation (R)	0.92996	R^2	0.86483	Significance	0.00000
Std Err of Est	0.93108	Intercept (A)	-0.14448	Slope (B)	0.93906
Plotted Values	59	Excluded Values	0	Missing Values	0

constitutes) a rate of growth in responsibility in work which is in line with the predicted rate of growth of his or her capability.

Within this group, there was one evaluation of current level of capability which was an underestimate. Apart from this case, the others have acted in line with the prediction of rate of growth of capability made in the Appreciation: Twenty-one percent have left the company. In 80% of those cases their leaving could have been predicted because it was clear from the Appreciation that they were underused. In four individual cases, a manager made the decision to promote a subordinate who (in terms of predicted rate of growth) was not yet ready for the extended responsibility. Three of these were demoted within six months and the fourth is showing signs of considerable stress.

The overall indication from preliminary analysis of this material is that (over a four-year period) the predicted rate of growth of capability has been borne out in 94% of the cases.

c. Comparison with other Long-term Studies

1. Summary of the studies

Two major longitudinal studies which set this research in context are those of Bray (Bray and Howard, 1983) and Anstey (Anstey, 1977).

(a) The Bray Study:

In 1956 the Bell Telephone Company decided to initiate longitudinal research into managerial lives. Four hundred and twenty-two new managers took part in a three and a half day assessment centre. Assessment included a battery of projective tests, psychological inventories, attitude surveys, interviews and simulations. The initial assessment of the group took five years and included two distinct populations of white males: recent college graduates hired as management trainees (N = 274) and non-college employees who had worked their way up in the company (N = 148).

In this study the predictors were 26 assessment dimensions derived from the total test battery. The criterion was the level of work defined as Level III, or district (in broad terms, middle management) or higher.

Each person was followed up by interview every year. After 8 years they were again put through an assessment centre; and, in the twentieth year, through a different assessment procedure. Both intelligence and knowledge test scores increased over the period, but there was a marked drop in score for interpersonal skills. In terms of some simulations, management skills were not improved in the eight-year period; and, indeed, some were lost.

The material reported from the follow-up after 20 years shows that as participants got older, their expectations became more realistic and

less optimistic. This shift was apparent by the fifth year and changed little over the next 15.

Bray and Howard (1983) concluded that, "to a great extent, measureable differences in managerial abilities and motivations that would foretell success were present when the men first came to the original assessment centre." Most of the 26 assessment dimensions had significant correlations with success after 8 years. Indeed most of these relationships held even after 20 years (page 301).

The correlations are displayed in Table 8.

Table 8

Some Assessment Exercises Predicting Management Potential over 20 years

Exercise	r
SCAT - Total	.40**
Range of Interests (Interview)	.30**
Organizing and Planning (In-Basket)	.19*
Inner Work Standards (In-Basket)	.24**
Need Dominance (EPPS)	.18*
Ascendance (GAMIN)	.20*
Expectations Inventory	.18*
Need for Advancement (Interview)	.44**

Note r's = 199 - 266

*p .005

**p .001

(b) The Anstey Study:

This is a 30-year follow-up of the Civil Service Selection Board procedure in the U.K. (Anstey 1977). Three thousand one hundred candidates for the Civil Service were assessed between 1945 and 1948; 421 between the ages of 21 and 30 were appointed. The follow-up sample was the 301 people still in the service in 1975.

The predictor was the mark (or grade) at the final selection board. This mark represents a summation of scores from tests and interviews concerned with intellectual, communication and interpersonal skills. The criterion was the rank achieved after 30 years. Most equalled or surpassed the predicted ultimate level of work, but some of this could be accounted for by an increase in the number of senior posts during the 30-year period.

The correlation between the final selection board mark and the rank attained was r = .354. That was then corrected for selectivity to r =

.66. Anstey suggests that this correlation may be an underestimate because of the nature of the sample in which all the individuals were very well educated. Anstey also points out that it is considerably higher than other correlations of tests of abilities with demonstrated competence at work.

2. Comparison of the Three Studies

(a) The samples: The Bray sample is the largest, with 422 members compared with 301 in the Anstey study, and 274 in this study. The composition of both the Bray and Anstey samples is less diverse than the sample of this study. Members of the first two samples are Anglo-Saxon and male. The sample of this study includes a small number of women and a fifth are African. The Bray sample includes graduates and nongraduates. Members of the Anstey sample were all described as "well educated". The educational qualifications of members of our sample range from very extensive high to very limited. The Bray and Anstey studies were both done in a single organization. Members of our sample were employed in four very different settings.

(b) The procedures for predicting potential: The Bray study used 26 different assessment dimensions which take some days and experienced observers to determine; the Anstey study used a range of assessment dimensions based on five days of tests, observations and interviews which were summarised in a single final mark. The tests, observations, and interviews all required skilled staff. A Career Path Appreciation focusses on the current capacity to generate complexity, takes only two hours to administer, but does require a highly trained administrator.

(c) The criteria: The criterion in the Bray study was a particular level of work or higher; in the Anstey study the criterion was level of work achieved. The establishment of that level was based on careful analysis and modelling of the work of senior staff. Our criterion was level of work achieved with the level evaluated by analysis of its complexity.

(d) Time scale of follow-up: The Anstey study extended over 30-year period; the Bray study over 20. Our longest period to date is 13 years. Some of the people have been followed up after only four years. In view of the fact that this study set out to test an already well-formulated and tested hypothesis about growth in capability, the shorter time scale can be justified. Where possible, further follow-up studies will be undertaken; but, in the present socioeconomic climate, it is becoming increasingly difficult to maintain contact with people who are less and less likely to remain in the employ of a single company over long periods of time.

d. Interpretation of the Data

In a recent article Guion (1987) raised important questions about the bivariate correlation between predictor and criterion -- the validity coefficient -- in selection research. Since selection research carries

with it an explicit or implicit concept of potential for growth, Guion's analysis is used here as a basis for looking at the validity of the whole process described above.

Guion pointed out that views of validity are changing and that the current trend is to expect to be able to rely on more than a single correlation coefficient. In order to consider these points in detail in regard to the data presented in this study, I will follow his categorization of the four components of the established practice: i) choice of predictors; ii) choice of a criterion; iii) data collection, and iv) evaluation of the predictors.

1. Choice of Procedures for Prediction

Guion (1987), suggests that the current trend is towards predictive procedures which are directly related to "work orientation", that is to say, a tendency to look to traits manifested explicitly at work rather than to those shown in a broader array of situations.

The procedure used in this study -- an evaluation of the respondents' current level of capability -- has been evolved from a definition of work which includes the psychological experience of doing work and the scale of the organizational setting in which it is being or is to be done. As stated above, a Career Path Appreciation is a procedure for considering and giving meaning to the relationship between individuals and the organizations that employs them to do work.

Within the Appreciation, the phrase cards give an indication of the extent of the current and future possible contexts in which the person can generate and respond to complexity. The symbol card task assesses the person's capacity to order chaos. Both indicate the relationship between the "cognitive map" available to each individual as a guide and the actual territory of the environment in which the person operates.

Both Ashby's Law of Requisite Variety and Korzybski's reminder that "the map is not the territory" are relevant here. They can be drawn together into the concept of the workscape of the individual -- that scope of responsibility for work and resources which the individual can map.

The concept of workscape emphasizes the link between an important postulate of SST theory and of the Appreciation. The postulate is that levels of work are differentiated by the dimension of complexity; the core of an Appreciation is an evaluation of the person's capacity to generate and to respond to complexity.

Further, a Career Path Appreciation is, explicitly, a procedure in which work-sampling is one of the prime components. A third point which is concerned specifically with the psychological experience of doing work will be discussed.

A further point about the predictor used in this study relates to its concurrent validity. As Guion (1961) points out, concurrent validity is no substitute for predictive validity, but it does give a useful indica-

tion of the relationship between the predictor and actual behaviour at work. Data on the concurrent validity of Career Path Appreciation have become available in four settings where an organization wished to use the procedure. But, before doing so, they wanted some indication of the degree of felt congruence between the evaluations made and the formal or informal managerial judgments of the respondents' current performance and likely rate of growth.

(a) In the multinational oil company two such correlations were made in the course of the original study. Both were formal because the company had in place a system for identifying potential. The first (of .71) was between the evaluation of current level of capability as made in the extended interview and the level of performance as stated on the company assessment forms. The second (of .86) was between the evaluation of current level of capability and the actual, verbal statement of the manager about performance. The discrepancy between these correlations raised questions about the company system of assessment which it was not possible to pursue.

(b) In a multinational chemical company where work started in 1985 a less formal study was done, but with the purpose of considering the match between evaluation and managerial judgment. In this case 37 respondents were involved, and the correlation was .79.

(c) As stated in Section 4, the fertilizer company undertook its own study of the correlation between "considered potential" and the evaluation of current level of capability. They found a correlation of .73.

(d) The British Army Staff College (where Career Path Appreciations have been offered for purely research purposes for the last eight years) has done informal correlations in five of those years; they range between .71 and .77.

An interesting point to be made about these indications of concurrent validity is the initial attitude of the organization that the correlation indicates the efficacy of their system, however formal or informal. On further reflection the conclusion is that, although it may be efficacious, it is not efficient simply because in-house judgments are not held to be reliable unless they have been built up over a period of time. Evaluation of current level of capability can be made in a Career Path Appreciation (which lasts for two hours).

2. Data Collection

Guion (op. cit.) suggests that the biggest change of view about data collection is in desired sample size. Researchers are now looking for much larger samples than the 30 or so subjects that were previously acceptable. The sample size of this study at present is 274. In view of the considerable difficulty of maintaining contact with respondents in the present social and economic circumstances where change of employment is the norm, a sample size of approximately 300 seems a fair number from which to draw conclusions. The detailed data presented here

refer to 182 people with preliminary analysis of a further 92 cases. These numbers are probably sufficient to indicate consistent trends.

3. Choice of a Criterion

Guion points out that 30 years ago a single, overall.criterion was regarded as "indispensable" for selection research (Nagle, 1953). By the 1960s the use of multiple criteria was being urged (Dunnette, 1963, Guion, 1961). But, by the late 1970s, results of validity generalization studies questioned whether fine distinctions among criteria were worth making; and the trend (once again) favoured an overall, global measure.

The criterion used in this study is defined by the theory which provides a well-tested model of the way in which work is organized in levels of increasing complexity. But there is a problem with this criterion. On the one hand, it is clearly job related in that the level of work at which the respondent is employed at the point of follow-up is the actual, social reality of what the organization is prepared to pay for current perceived levels of capability. On the other, one of the difficulties of follow-up of this kind is that it was not possible to use the time-span of discretion -- the instrument for measuring levels of work which is made available by the theory. However, the level of work can be categorized by examining the work itself and directly analyzing the level of complexity.

The settings in which the work was done were such that it was possible to accommodate the ways in which work was structured within the organization with the structure of complexity provided by the model. But in pure terms it was not possible to use a fully construct-related criterion.

4. Construct Validity

a. The array of growth curves:

SST makes it possible not only to place predictor and criterion in the *same content domain*, but also (by means of the array of growth curves) to predict the relationship between the two for a given individual at a given time.

As we pointed out on page 4, a common assumption in all assessment is that adults develop and that they develop at different rates. This assumption may be formalized in a minimum development curve which assumes a certain rate of growth. The array of growth curves in the model makes it possible to go beyond the idea of a minimum development curve to offer a specific prediction about the likely rate of growth of the capability of a particular individual.

This study is both an application and a test of the slope of the array of growth curves derived by Jaques from data on individual earning progression and offered as a hypothesis about the growth of the capacity to exercise discretion which, at any given time, will be manifested in the person's current level of capability.

Details of other tests of the slope of the curves are available in the more extensive Technical Report on the Prediction of Potential. A more general point may be made here about curves of this general type. In biology there has always been considerable interest in the growth processes of living systems. In one study quoted by Saunders (1967), a comparison was made between three growth curves plotted by measurements over a period of time: That of an individual plant (a sunflower seedling), that of a multicellular organism (a colony of bacteria), and that of a population of organisms (fruit flies in a bottle).

In each case the same form of curve was found and further study showed that a mathematical equation called the logistic curve of the form

$$X = \frac{A}{B+e^{-at}}$$

would fit all three of the curves. In view of the very different nature of the three living systems, this is a remarkable finding.

This form of curve has also been used to predict the growth patterns of populations, industries and industrial products. A number of studies of predictive validity have been done e.g. Lasky, 1951; Pearl, 1922). One study showed that the final height of a sunflower seedling could be predicted to +/- 5%, if the data for more than 50% of the life cycle were used. A similar study fitted the logistic curve to the growth of railway track in Britain in the nineteenth century. The data to 1870 (which were past the peak) gave a ceiling prediction of 20,000 miles in 1920 whereas the actual ceiling was 23,700.

Saunders found that the logistic curve could readily be fitted to Jaques' array of growth curves; and hypothesised that they too would have a very high degree of predictive validity. However, in the absence of a procedure which could place a person on a particular curve, he was unable to test his hypothesis. Of special interest are the studies indicating that the final point of the matured curve can be predicted with +/- 5% accuracy if the data for more than 50% of the life cycle is available. If we apply this to the capability growth curves (see Figure 1), it would suggest that it would be progressively more difficult to predict the final point of the growth curves in those people whose capability will not mature until mid-life or beyond (those whose comfort curves fall within modes VI, VII and VIII). This could explain the widely accepted difficulty for managers in recognizing and acknowledging the potential of these people in their 20s, with the consequence that they are not given appropriate opportunities. This difficulty may be contrasted with the intuitive recognition of the potential of people whose comfort curves fall within modes IV and V -- the assumption being that the curve is a straight line and the risk that they may be overpromoted.

The correlations obtained from the data presented offer further evidence for the predictive validity of the array of curves as the representation of an intrinsic pattern of growth in the capability to generate and to respond to complexity.

b. The Capacity to Generate and to Respond to Complexity

The correlations reported can be partly accounted for in terms of the coherence of the underlying theory and the predictive validity of the array of growth curves. The coherence of the theory rests on a definition of work that allows a common approach to the levels of complexity in which work is organized, the individual capacity to generate and to respond to those levels of complexity, and the growth of that capacity within and across levels. It is this coherence that has made it possible to develop a more accurate procedure for predicting potential.

Almost 20 years ago, Jaques (1970) suggested that the capacity to generate and to respond to complexity was dependent on a constant interplay between verbalized and non verbalized material. He pointed out that although "the exercise of discretion" is a profoundly familiar sphere of psychological activity, it is conceptually ill-defined. As a consequence, there is no satisfactory language for it.

People simply cannot put into words all that they are taking into account in making the decisions that will forward their work. In that sense, they cannot be sure that what they have decided to do will get them where they want to go, will achieve the result they want to achieve. They judge, think, hope -- and, indeed, pray -- that it will, but they cannot be sure. Only time will tell. In an attempt to convey the experience of the interplay between verbalized and non verbalized material and its significance for them, people tend to use words like "judgment, intuition, nous, skill, experience, know-how, common sense, gut-feel, hunch, discretion, discrimination".

Over the last 20 years there has been a steady growth of interest and research into the processes of decision-making. One of the significant outcomes has been the distinction between "rational, logical, analytic" styles which are readily expressed in words or numbers and "non rational, intuitive" styles which find readier expression in symbols and images (see, e.g., Mintzberg, 1976). Some of this research has been underpinned by neurophysiological evidence (see, e.g., Levy-Agresti and Sperry, 1968 and Gordon, 1986) and some by work in artificial intelligence and expert systems (see, e.g., Barr and Frigenbaum, 1982 and Simon, 1979).

Another strand in this tapestry can be seen in what may be thought of as "techniques" for enhancing creativity in decision-making. Many draw explicitly on the use of symbols, metaphors and images in order to draw on material which has not been verbalized (see, e.g., Gordon, 1961, de Bono, 1971; and Prince, 1982; and, for a review, Rickards, 1987).

In a recent article about the role of intuition and emotion in decision-making, Simon (1987) argues that it is fallacious to contrast "analytical" and "intuitive" styles and that the effective manager "does not have the luxury" of choosing between the two. He refers to Barnard's (1938) distinction between "logical" and "non logical" processes for making decisions and quotes his comment that "By 'logical' processes I mean conscious thinking which could be expressed in words or

by other symbols, that is, reasoning. By 'non logical processes' I mean those not capable of being expressed in words or as reasoning, which are made known by a judgment, decision, or action".

In considering contemporary views of these "two different forms of thought", Simon (op. cit.) is critical of what he calls "the more romantic versions" of the split-brain research. But he goes on to argue that there is now a substantial amount of evidence for the two different forms as essential components of the complete domain of decision making (see, e.g., Simon, 1979; Doktor, 1978; Gordon, Charns and Sherman, 1987; Rickards, 1987; and Taggart and Robey, 1981). In particular, Simon emphasises his observation that people reach decisions without being able to report the thought processes that took them to their conclusion.

A considerable and growing trend in current thinking about decision-making, including, e.g., Sternberg's (1985) work on "tacit knowledge", which emphasizes "insight", "gut-feel", "intuition" and the significance of access to non verbalized material. Career Path Appreciation -- which is now a widely applied and well-researched procedure -- can contribute to this approach to decision-making in three ways:

1. It can extend understanding of these processes in general terms.

2. It can made it possible for the respondent to make spontaneous discoveries about the internal, non verbalized resources s/he has been using in decision-making about work. This can, then, increase his/her skill in gaining access to them. In addition, the administrator can offer explication of the way in which the respondent seems to be drawing on internal resources, thus heightening awareness of the resources, affirming use of them, and further enhancing access.

3. Because it is a predictive procedure, an Appreciation can offer an opportunity for a better understanding of the current and likely future range of one's decision-making capability. Further, the underlying theory can contribute to an extended understanding of the relationships between levels of complexity of work and range of complexity of decision-making in the life of organizations and of individuals.

The final point is that the construct validity of Career Path Appreciation rests in a coherent theory of work. The theory offers a definition of work, a hypothesis about increasing complexity in the way work is organized in response to extending environments and, a hypothesis about individual differences in growth in the capability to do work of increasing complexity.

The research described in this report -- in particular, the accuracy of the predictions of rate of growth of potential -- provides further confirmation for these hypotheses:

(1) The hypothesis that there is discontinuity between levels of complexity in work and in individuals. The evaluation of current level of capability is made on the premise that there are qualitative differences between levels and that they can be observed by a well-trained administrator.

(2) The hypothesis that adults do develop, that they do so at broadly predictable rates, and that there are differences between individuals. The confirming evidence for this comes from the follow-up data which demonstrates that, in a heterogeneous sample of people in four organizations operating in diverse environments and various parts of the world, differences in rate of adult development at work are recognized by promotion and pay, and can be predicted by an Appreciation.

In the first section of this report I suggested that a coherent theory was required to enhance the content and the predictive validity of procedures for predicting potential. I conclude by suggesting that the correlations obtained in these follow-up studies confirm the power of the theory used as the basis for Career Path Appreciation. The definition of work as "the exercise of discretion within prescribed limits" made it possible to develop a procedure based on work-sampling. The hypothesis about discontinuity in states of complexity brought predictor and criterion into the same content domain and made it possible to evaluate current capability. The array of growth curves provided an explicit hypothesis about rate of individual growth.

Career Path Appreciation can be seen as an application, a confirmation; and, in some ways, an extension of Stratified Systems Theory.

Gillian Stamp
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THREE STUDIES IN STRATIFIED SYSTEMS THEORY (SST)

Elliott Jaques

This article outlines findings from three studies which have been conducted to test certain basic propositions in Stratified Systems Theory (SST).

Stratified Systems Theory is concerned mainly with bureaucratic organizations, which have the form of hierarchies of roles, with superior roles carrying accountability for the output of subordinate roles; that is to say, accountability hierarchies, or ACHs.

A major underlying thesis of SST is that there is a requisite number of levels of organization - organizational strata - for any ACH. The number of strata required will depend upon the scale of the organization; seven strata, with leadership if possible from an eighth, will be required for organizations on the scale of the Army. These seven strata are reflected in the seven echelons of combat organization - from Enlisted level through Company, Battalion, Brigade, Division, Corps, EAC.

The work at each of these organizational strata is characterized by tasks of given complexity, the levels of task-complexity proceeding step-wise from stratum to stratum, with each lower level of complexity nesting within the next higher level of complexity.

It is thus necessary to establish increasingly complex frames of reference to cope with the successively higher levels of complexity associated with the successively higher organizational strata. Work at each stratum therefore requires levels of individual capability which can cope with the level of task-complexity at that stratum.

The competence necessary to carry a given level of task-complexity comprises: cognitive complexity, which determines the highest level of potential capability of an individual; plus knowledge, skill, values, wisdom, and temperament, which combine to determine just how much of the potential a person will actually be able to utilize in particular kinds of work at particular levels.

The level of complexity of a role can be assessed in two ways. It can be

judged by the level of maximum complexity in any of its tasks. And under ordinary working conditions (i.e., not under the abnormal pressures of combat) it can be measured by the time-span of discretion. It was the fact that under normal conditions the boundaries between organizational strata occur at the same time-span level in all ACHS in varied cultures, that led to the observations about possible systematic steps in task-complexity and cognitive complexity at successively high levels of organization.

It was also found that the progressions of individuals in real total earnings with age follow a roughly regular pattern throughout adulthood, the higher the earnings the steeper the progression. This finding led on to the further finding that their judgments of what would constitute a fair progression in total earnings follows the same pattern as the earning progressions, it being possible to predict a person's felt-fair total earnings in five years' time from their current judgment of what would be a fair total earning now.

From these findings it was hypothesized that a person's potential capability (cognitive complexity) would progress in accord with one or other of the felt-fair earning progression curves. A method has now been developed for assessing potential capability (Career Path Appreciation procedure - CPA) and the likely maturation patterns for cognitive complexity (described in Stamp, 1988).

These findings and concepts relating organizational structure and managerial capability have contributed to an analysis of leadership tasks by level and of the leadership skills required by level (Jacobs and Jaques, 1986). They are helping to clarify the factors underlying growth in

managerial and leadership competence, and, in so doing, contributing to managerial and leader development programs.

The three studies to be described test the connections postulated in SST between complexity, time-span, level of work, and felt-fair pay, and the growth of individuals in time-horizon which in turn relates to time-span and felt-fair pay. The extent to which the studies are consistent with the predictions that would be made by the use of the concepts and principles of SST would provide support for the theory itself.

One of the studies is work by Dr. Roy Richardson between 1965 and 1968 on the relationship between felt-fair pay and time-span measurement. The second is a study by Dr. Edna Homa in the mid-1960s of the factors leading to the projections by indivdiuals of what they would see as a satisfying career progression. The third is by Dr. Tom Kohler on individuals' actual records of what constituted "comfortable" career progressions over periods of 10 to 20 years and more.

The Richardson Study

This work was published in Dr. Roy Richardson's book Fair Pay and Work (1971). The work was carried out in the Honeywell Corporation at their headquarters in Minneapolis, and the research was supervised by Dr. Marvin Dunnette of the Department of Psychology at the University of Minnesota[1]. The population studied comprised 180 members - 60 each from the factories, from engineering, and from administration - drawn from 1400 'middle managers' working in three different divisions. The sample was trichotomized into high, middle and low levels by salary, with 60 members in each group.

In addition, the managers of each of the 180 members were interviewed, giving a total population of something under 360 (a few of the managers had more than one subordinate in the sample).

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[1] Dr. Dunnette acted as Dr. Richardson's doctoral supervisor; Dr. Richardson's book was taken from his doctoral thesis.

A literature search revealed a wide range of factors which might possibly explain people's statements on what would constitute fair pay for the work they were being given to do (felt-fair pay).

An experimental pre-test enabled the experimenter to reduce these to the following critical variables:

TSD_M Time-span of discretion given by the man (subordinate).

FFP_M The man's (subordinate) felt-fair pay for the job he is on at the time of interview.

AGE Subordinate's age at interview.

YBS The years between the year of graduation with baccalaureate degree and the date of the interview, rounded off to the nearest year.

MSC Subordinate's months of company service (tenure).

AP Actual pay of the man (subordinate).

MSI Months since last increase (subordinate).

MDPT Midpoint of the salary range for the man's (subordinate's) job grade.

KH_M Rating of the know-how necessary for the job as seen by the man (subordinate).

PS_M Rating of the problem-solving ability necessary for the job as seen by the man (subordinate).

FA_M Rating of the freedom to act in the job as seen by the man (subordinate).

MR_M Rating of the management responsibility in the job as seen by the man (subordinate).

IJ_M Rating of the impact by the job on end results as seen by the man (subordinate).

TSP_M Time-span of planning - the maximum period of time for which specific work is planned, as seen by the man (subordinate).

ME The subordinate's estimate of what his job is worth on the market (market estimate).

TSD_B Time-span of discretion given by the boss.

FFP_B Felt-fair pay of the subordinate's job as seen by the boss.

KH_B Rating of the know-how necessary for the job as seen by the boss.

PS_B Rating of the problem-solving ability necessary for the job asseen by the boss.

FA_B Rating of the freedom to act in the job as seen by the boss.

MR_B Rating of the management responsibility in the job as seen by the boss.

IJ_B Rating of the management impact of the job on end results as seen by the boss.

TSP_B Time-span of planning - the maximum period of time for which specific work is planned, as seen by the boss.

FPAPM Fair comparitor with same actual pay as seen by the man (subordinate).

APKHM Actual pay of comparitor with same know-how in the actual job as seen by the man (subordinate).

APFAM Actual pay of comparitor with same freedom to act in the job as seen by the man (subordinate).

APTSPM Actual pay of comparitor with same time-span of planning as seen by the man (subordinate).

KH_O Rating of know-how in the job of the comparitor as seen by the man.

FA_O Rating of freedom to act in the job of the comparitor as seen by the man.

TSP_O The time-span of planning in the comparitor's job as seen by the man.

Judgments of each of these variables were obtained separately from the subordinate and from the boss in relation to the subordinate and the subordinate's job.

The data were collected by four interviewers who knew nothing about the time-span/felt-fair-pay relationship. In each case different interviewers interviewed the boss and the subordinate. The time-span of discretion measure was taken first; the felt-fair pay question was asked second by handing a written questionnaire to the interviewee; and the interviewees'

judgments about the other factors ws obtained third.

The following table shows the correlation between time-span of discretion as measured by the boss and the felt-fair pay as judged by the man in relation to the other variables used in the study.

TSD_B and FFP_M Correlations

in Order of Association

	TSD_B		FFP_M
FFP_M	0.862	TSD_B	0.862
TSD_M	0.856	AP	0.857
AP	0.740	MDPT	0.806
FFP_B	0.727	FFP_B	0.796
MDPT	0.720	TSD_M	0.739
ME	0.528	ME	0.572
TSP_M	0.490	KH_B	0.458
PS_B	0.438	PS_B	0.428
KH_B	0.432	TSP_B	0.424
TSP_B	0.410	KH_M	0.423
FA_B	0.407	TSP_M	0.419
KH_M	0.393	PS_M	0.380
MR_M	0.388	IJ_M	0.379
PS_M	0.375	FA_B	0.374
MR_B	0.370	IJ_B	0.344
IJ_M	0.349	MR_B	0.341
IJ_B	0.331	MR_M	0.338
FAM	0.229	FA_M	0.250
AGE	0.080	AGE	0.167
MSI	0.053	MSI	0.063
MCS	−0.1034	MCS	−0.0575

From this table it may be noted that:

1. The time-span of discretion as measured by the boss (and this is the critical measure of time-span) correlated 0.86 with the felt-fair pay independently stated by the man for his work.
2. The time-span of discretion measured by the boss correlated 0.74 with actual pay.
3. The felt-fair pay of the man correlated 0.57 with the man's estimate of what his job was worth on the market.
4. The rest of the correlations on job evaluation variables and social comparitors ranged from about 0.45 downwards.
5. Regression analysis showed that time-span of discretion as measured by the boss explained 38 per cent of the variance in the subordinate's felt-fair pay, actual pay explained 28 per cent of the variance, and none of the other variables had any explanatory significance.

This study has produced the strongest confirmatory evidence of a significant relationship between measured time-span in a role and the felt-fair pay of the individual in that role.

The Homa Study

In a doctoral study carried out at the Harvard Business School in the mid-1960s, Dr. Edna Homa set out to test individuals' judgments about their level of capacity and its growth, and about the reasonableness of their judgments about fair pay for the work which they thought would be just right for them at a given moment. As she expressed it:

"There is a pervasive cynical opinion that a person's response to the question - How much is he worth to his employer? - is that he will estimate an unsupportably high figure. In contrast, the hypothesis that this thesis set out to test is:

> People employed in organizations have an intuitive judgment of their level of capacity at any given time and can express this in the financial terms of felt-fair pay. Having this judgment they are also capable of judging whether or not their job is suited to their current level of capacity. Such people, furthermore, also have an intuitive awareness of the rate at which their capacity will grow into the future (about five years out) and can express also this estimate in terms of felt-fair pay."

Five private companies in diverse lines of business and the Federal Civil Service were investigated. In each company a sample of about 30 men was interviewed. A total of 179 men, ranging in age from 23 to 64, earning from $65 a week to $60,000[1] a year provided data for analysis. Interviews with managers of some of these men added further information. In each organization payment and progression policies were studied in order to note differences and their possible effect on interview responses.

The data were arranged for multiple regression analysis and so studied.

It is a certain conclusion that the cynical position referred to above is not supported by the data. In fact, the highest correlation obtained was between the actual pay a man received and the pay he thought fair in relation to a level of work that he felt would absorb his existing capacity, whether he had such a job or not. A number of people felt that they were overpaid. It appears, then, that an employed person can distinguish, for himself, among the following categories:

1. The fairness of his pay for the work assigned to him.
2. The adequacy of his work assignment with reference to his capacity.
3. The adequacy of his pay with reference to his capacity.

These distinctions permit one to differentiate between a situation of underpayment and a situation of underemployment. It is possible, for example, for a person to feel both overpaid for his actual work and underemployed in it. Such situations, it appears from the data, are more prevalent than commonly believed. Even though business organizations intend to pay fairly and to employ people fully, 50% of the people interviewed were aware of being either inadequately paid or inadequately employed.

It was not possible to conclude as affirmatively that employed people could judge the rate of their capacity growth into the future in the same financial terms of felt-fair pay. However, satisfactory evidence exists that people are aware of their capacity growth and seek greater responsibilities over time. The need for an increased level of responsibilities varies among individuals; and for each person, it varies with age.

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[1] 1965 values. Current (1987) equivalents would give a range of the order of $15,000 to $200,000 per annum.

Data from the study on the nature of financial rewards and what these rewards are for demand a re-appraisal of current thinking about the motivation to work, widely assumed to be present in incentive payment systems.

The results of the study furnish support to an existing hypothesis that the growth over time of people's capacity to perform work follows a regular pattern. Examination of companies' payment and progression systems strongly suggests that they are consistent with this hypothesis. However, in their administration this hypothesis is repeatedly violated. Despite differences in the nature of the business and apparent diversities in payment and progression policies, the companies studied produce substantially the same actual payment and progression results. Payment appears to follow some widely-held general standard that is related more to level of responsibility in the job than to its substantive content.

From the findings of the study several practical implications for business organizations are offered:

1. Payment systems and progression policies need thorough revision to take account of the differential nature of capacity growth. The disguised form of egalitarian payment increase policy now prevalent is liable to build tensions into any situation where felt-fair pay is being neglected or ignored.
2. Managers, faced with the inevitable requirement of judging the continuing availability and optimal use of human capacity should be alerted to the possibility of systematizing progression planning on an individual basis. Manpower planning under varied conditions - growth, status quo or contraction of work - can proceed systematically and with continuity.
3. Selection procedures, especially as regards young, very promising people, must supplement current practices by considering if and how soon a given person will outgrow the job; and whether and when suitable opportunities may become available to absorb growing capacity.
4. The differential nature of capacity growth has significant effects on the growth potential of a business. An organization cannot grow unless the growing capacity of its chief executive provides continuous pressure to become manifested in organization growth. This should be a matter of continuous concern to Boards of Directors.

It will be noted that felt-fair salary and age are the strongest predictors of an individual's judgment of where they would get in 5 years' time. Examination of these curves against the background of the SST hypothesized capability progression curves shows a striking if not perfect consistency.

The Kohler Study

Dr. Tom Kohler, a clinical psychologist with the VA hospital at UCLA Medical School, analysed data obtained by Jaques over periods of 10 to 20 years. The data were from a population of 58 individuals whom Jaques had seen at irregular intervals at points where they wished to discuss their careers and possible career development. The data included the time-span levels at which the individual was working at the various times, the individual's judgment about fairness or unfairness in pay at those times, and, in particular, the individual's judgments about the comfort of the level of work that he was carrying in terms of a sense of being employed at a level just right for capability as against his capability being under-employed, or on the other hand of his having been progressed to a level of work above his current capability.

Kohler took the data and pulled out all the points at which each individual felt that his level of work corresponded "comfortably" with his capability at that time. From these data he drew what he called a "comfort curve" for each individual in terms of time-span and age, his hypothesis being that the comfort curves would correspond to the capability progression curves postulated by SST. The attached chart shows the complete comfort curves. 95 per cent of the comfort curves sit within a given mode band - at most touching the boundary of one of the modes - while 90 per cent of the curves do not even touch the boundary.

The data would support the notion that individuals mature in capability in a manner significantly consistent with the capability progression hypothesis - at least as shown by individuals' judgments about what constitutes a 'comfortable' level of work at any given age.

Discussion

The findings from these three studies interweave in an interesting way, and their connections are highly suggestive in supporting some of the central conceptions of Stratified Systems Theory, even though not conclusive.

The first overlap is that all three studies show a strong relationship between the assessments individuals give of levels of work (either in terms of judged time-spans or as compared with other roles) on the one hand, and their felt-fair pay judgments in relation to those levels of work, on the other.

This connection between these two sets of judgments is striking, and must be tied up with some kinds of underlying objective conditions. These conditions according to the theory have to do with two phenomena: the first is that there is an objective condition which may be referred to as level of work, which people experience in terms of the felt weight of responsibility in a role - which can be measured in time-span of the role; the second is that people do have a universal set of norms of what would constitute fairness or justice in differential pay related systematically to differentials in level of work.

This notion of the existence of norms of differential fairness or equity is further supported by the Richardson study in which objectively measured time-spans of roles as decided by the manager's assignment of tasks, show a correlation of 0.86 in relation to the subordinate's judgment of fair pay for the work being assigned.

Moreover, all the studies show that people are able to distinguish sharply between fair pay for the work they are actually being given to do, and what would be fair pay for the work they believe themselves to have the potential to do if they had the opportunity. By the same token, it indicates that people are able to judge the extent to which their current level of work coincides with their current level of potential working-capacity. This last proposition is supported by Kohler's analysis of what he calls the comfort curves; these curves represent levels at various points in their careers when not only were individuals able in fact to carry given levels of work successfully, but they felt comfortably stretched in doing so.

The conjunction between felt-fair pay and time-span at points in career when individuals felt comfortably employed is further evidence of the proposition

that time-span does give an objective direct extensive ratio-scale measure of level of work.

Finally, the Homa study supports the SST proposition that there are regular maturation curves of potential working-capacity which individuals are aware of, and which conform to the array of time-horizon maturation curves. This proposition is substantially reinforced by Kohler's "comfort curves" for individuals over periods of 10 to 20 years, which conform so strikingly to this array.

Conclusions

The following basic propositions of SST are supported by the three studies outlined.

1. Time-span is a valid and reliable measure of the level of work in roles in Accountability Hierarchies (ACHs).
   - o Time-span is an objective direct extensive ratio-scale measure, simply administered and devoid of the rater bias which bedevils current job evaluation methods.
   - o It could constitute the basis for job classification systems.
2. Contrary to current belief, people do have a deeply-ingrained innate sense of fairness and justice with respect to their pay, and are not simply greedy and thoughtless.
   - o The SST-postulated norms of equitable pay differentials for level of work in a role are upheld in detail.
   - o These norms could constitute the basis for an equitable differential pay system in the Army and in the Civil Service.
   - o Despite the many reasons which people cite as being important with respect to pay, such as versatility, imagination, foresight, skill, initiative, innovation, specialist knowledge, etc., it is level of work alone which in fact determines people's views about pay: "equal pay for equal levels of work, with a fair differential distribution" is an appropriate slogan.
   - o The other factors which are cited have to do with individual capability and the reasons people have for explaining the work they think they are capable of doing (and which in turn ought to have fair pay).

3. The hypothesis that individuals mature in potential working-capacity (time-horizon) in accord with the SST-postulated progression array is supported.
   - There is validation for the use of these curves in conjunction with the CPA procedure for career development.
   - The hypothesis that individuals do not mature up one single pathway but rather via a multiplicity of maturation pathways is supported.
4. Although none of the studies deals explicitly with organizational structure, there is support for the validity and reliability of the use of time-span measurement for identifying the boundaries between requisite organization levels (i.e., at 1D, 3M, 1Y, 2Y, 5Y, 10Y, etc.)

Finally, the systematic support found in these studies for SST hypotheses connected with level-of-work measurement, norms of equitable pay differentials, the maturation of potential working-capacity, and the deep-rooted and realistic awareness of individuals about their levels of potential capability and fair and just pay, lends some credibility to the theory as a whole.

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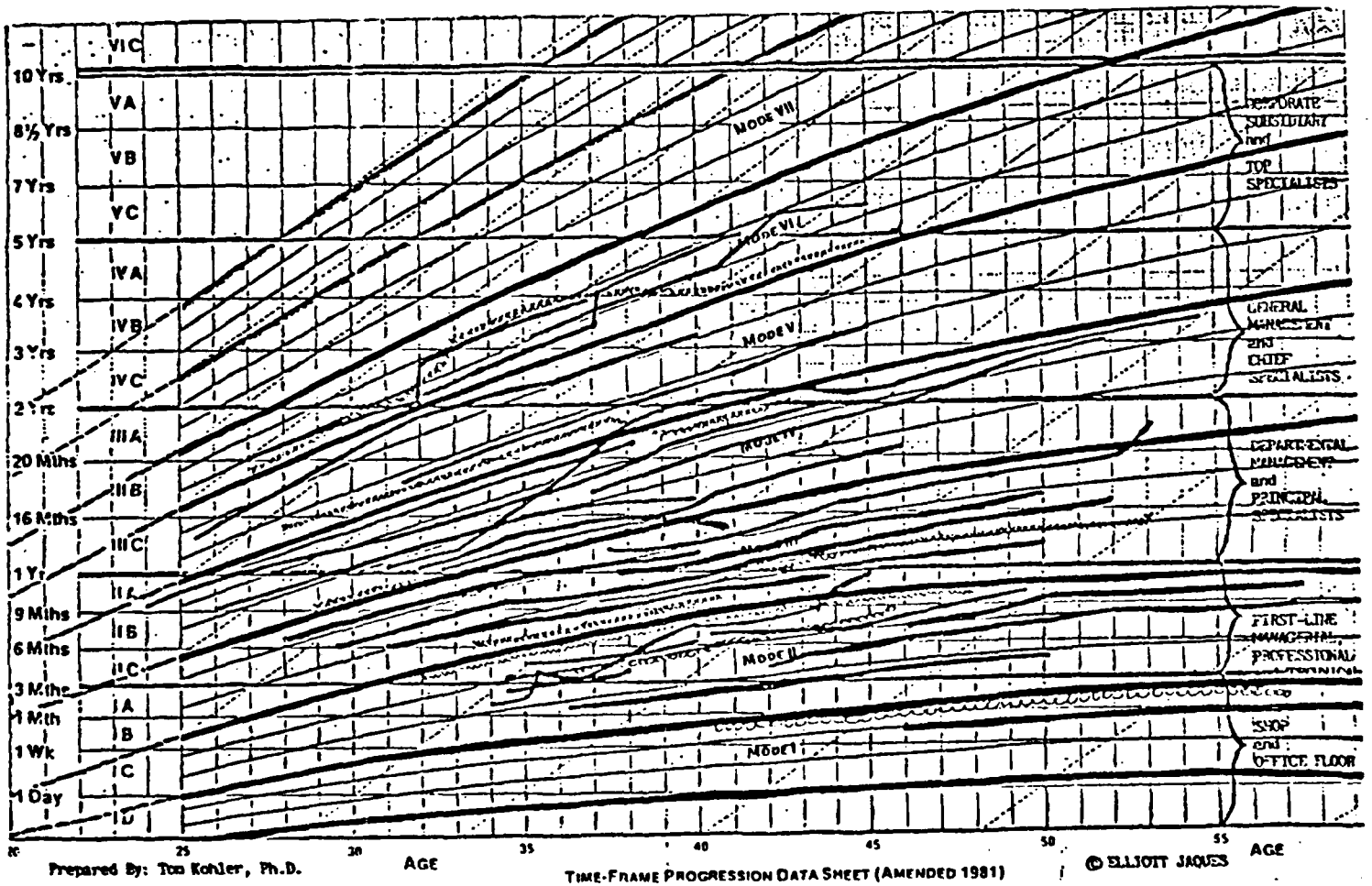
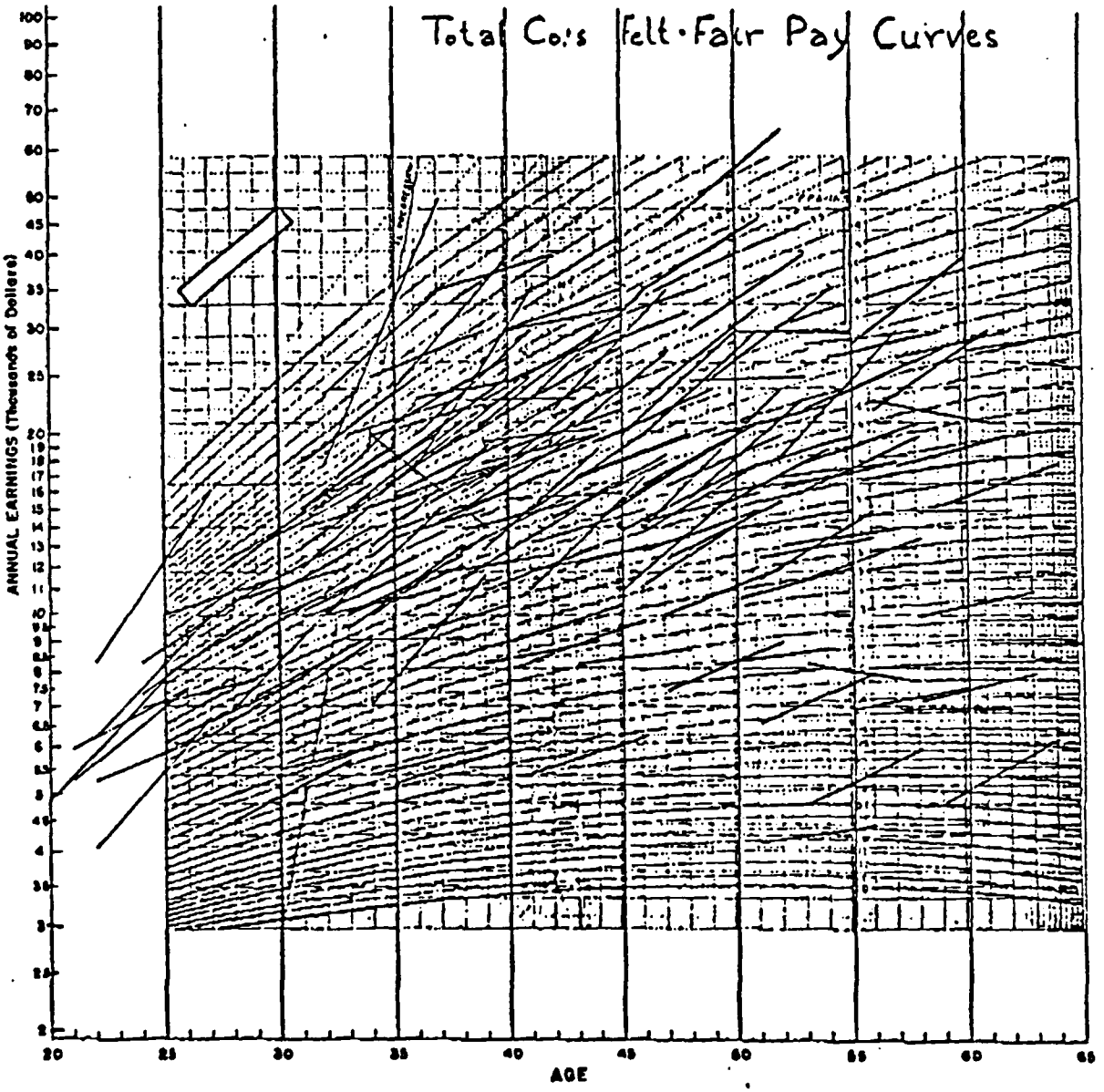
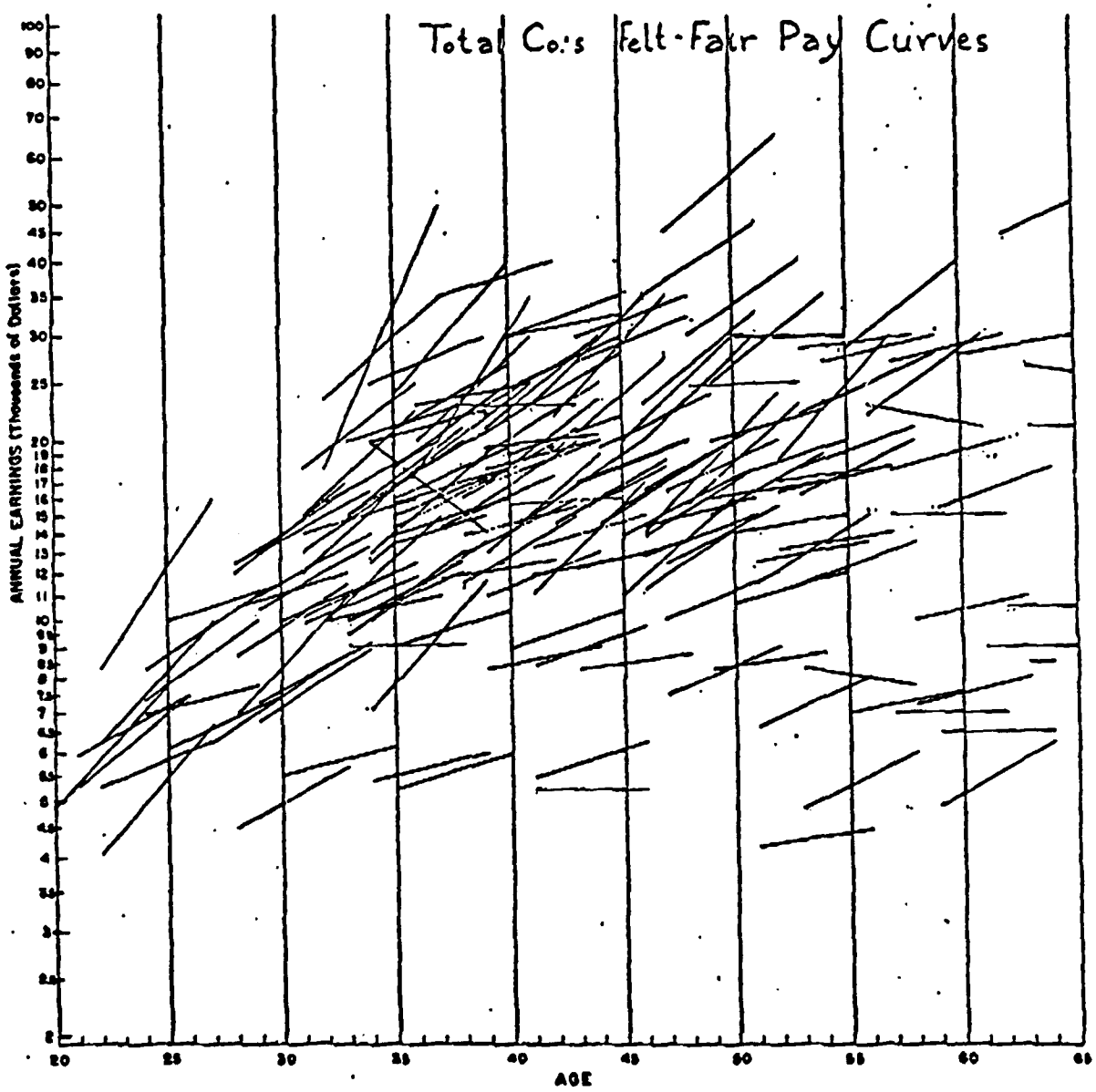


Prepared By: Tom Kohler, Ph.D.

TIME-FRAME PROGRESSION DATA SHEET (AMENDED 1981)


Total Costs Felt-Fair Pay Curves
ANNUAL EARNINGS (Thousands of Dollars)
AGE
20
25
30
35
40
45
50
55
60
65


Total Co.'s Felt-Fair Pay Curves
ANNUAL EARNINGS (Thousands of Dollars)
AGE

Notes on the Development of Stratified Systems Theory and Career Path Appreciation

a) Introduction

Stratified Systems Theory (SST) (see Jaques, 1975 and Evans, 1979) is the only theory I have been able to find which defines work in such a way as to allow precise description and, under certain conditions, measurement. The theory rests on a definition of work as "the exercise of discretion within prescribed limits in order to reach a goal within a stated completion time". The history of the development and testing of this definition, and of the hypotheses that it has generated, is considerable. In order to give the fullest possible interpretation to the data on predicting potential presented later in this paper, it will be necessary to consider that history and testing in some detail.

b) The History of SST

(i) *Status and Grading*

The history lies in forty years of research by Jaques and his colleagues into work and the way it is experienced, rewarded and structured. Jaques' earliest study - in collaboration with employees in an engineering company - was of issues of status and grading. In the course of these studies it emerged that clarity about these difficult questions required some means of measuring the real differences that people felt between different pieces of work.

Attention was soon focussed on the need for an objective index of responsibility. This focus pointed, in turn, to the need for a definition of work with particular characteristics. It had to encompass the notion of responsibility, include what actually 'went on' inside the person doing the work, and lend itself to quantification.

(ii) Time-span.

The definition of work and the design of a tool for quantification emerged from Jaques' growing sense that there might be a measureable relationship between the experience inside the individual of the "size" or "weight" of a job and the time over which the responsibility for it was carried. He was encouraged to make a study of this relationship and the study came to focus on two complementary aspects - the experience of the individual as s/he felt their way through choices about the alternative courses of action which would allow them to realise the goals for which they were responsible; and the way in which managers allocated and reviewed tasks. The bridge between the two was the concept of responsibility.

(iii) The Definition of Work.

This study led to the definition of work given above - the exercise of discretion within prescribed limits in order to reach a goal at a stated completion time. In order to understand the place of responsibility in this definition and to see how the definition made it possible to quantify discretion, it is necessary to look at each of its elements in turn.

The prescribed limits are the real rules in the form of policies (written and unwritten), procedures, physical controls, signals and other types of control which are objectively set and which must be obeyed. By stating the boundary in this way, the limits define the scope of the discretionary environment - that range of experience and information which is not excluded. The prescribed limits free the person to use his or her own discretion or judgement in the delicate process of feeling towards the wisest way of forwarding the work for which s/he is responsible.

From a psychological point of view, the essential difference between the prescribed limits and the discretionary content lies in their points of reference during the actual process of doing the work. In the case of

the limits, the person can assess and control his or her contribution to the process by reference to objective, outside standards laid down in regulations and procedures which require knowledge and competence.

In the case of the discretion, possibilities, choices and decisions must be continually weighed against each other as the work is actually being done. Appraisal and control of the discretionary contribution can be achieved only by reference to intuitively sensed standards within the self; as a consequence there is considerable uncertainty about possibilities generated and choices made, and this has to be tolerated until the task is complete.

From the point of view of quantification, the essential difference between the prescribed limits of the field of work and the play of discretion within it, is that the former can be stated in objective terms. At first glance it appears to be the case that the exercise of discretion cannot be measured but simply evaluated in terms of whether or not it has been good enough.

However, when a manager allocates a task, it is possible for him or her to specify a point in the future when the whole piece of work - including the adherence to the limits and the exercise of discretion - will be deemed complete. This targeted completion time marks the end of the period through which discretion will have to be exercised in order to complete the task, and makes it possible to measure that targeted process in units of time. With this concept of the targeted completion time *of each task*, it becomes possible to ascertain objectively those tasks in any given role which have the longest targeted completion time. It is these longest tasks which Jaques found to coincide with individual's feelings of weight of responsibility in a given role (and with their sense of fair-pay). This measurement, called the time-span of discretion, gives a precise and objectively quantifiable meaning to the concept of amount of responsibility.

Time-span is the essential link between the external level of work and the internal sensation of the person. It measures an external datum - the maximum period of time a person's manager is targeting him or her to bring a piece of work to completion. But the significance of this external datum is that it reflects the sensation within the person of the weight or size of the responsibility they are carrying.

(iv) Pay

With the relationship between the exercise of discretion and time scale of level of work established, attention was turned - at the request of the employee - to the issue of pay. In the course of interviews, information about actual earnings was recorded: in addition, information began to emerge about the earnings that people felt would be fair for the work for which they were responsible. It gradually became clear that there was a very high degree of correlation between what came to be called 'felt fair pay' and time span as a measurement of the size of the discretion being exercised. Jaques recorded correlations of .90 (see Jaques, 1977), Richardson of .86, Gould of .95, Boals of .90 (see below for details of Richardson's study; see also Homa below, see references for Gould and Boals).

(v) Levels of Work

The use of time-span as a measure of level of work in a wide range of different organizations led to the discovery that managerial levels of organization occur within a regular pattern of time boundaries. Thus, no true managerial roles will be found below 3 months time-span; a second managerial level emerges at 1 year time; then at successively higher levels at 2 years, 5 years, 10 years, and 20 years time-span. These bounded levels - or strata - are shown in Table 1.

Table I Levels of Work in Civilian and Military Organisations

Level of Work	Time-span		Description	Civilian Organisation	Military Organisation
VII	50 yrs	strategic	Strategic design; development; deployment of complex systems	Corporation	Macom/Army Board
	20 yrs				
VI			Direct deployment of complex systems	Group	Corps
	10 yrs				
V		comprehensive	Complex system; encompassing operating systems and modifying context	Subsidiary	Division
	5 yrs				
IV			Alternative operating systems - general management	General Mgt	Brigade
	2 yrs				
III		operational	Direct-operating systems - management of a mutual recognition unit	Unit	Battalion
	1 yr				
II			Direct operating methods - supervision of a mutual knowledge system	Section	Company
	3 mths				
I			Direct operating tasks.	Shop Floor	Squad

(vi) Growth in The Capacity to Exercise Discretion

In 'Measurement of Responsibility' (Jaques, 1956) there is an account of discussions of career histories with six people who had been asked to give examples of the jobs they deemed the biggest at various stages of their careers. These jobs were analysed and the maximum time-spans plotted with respect to age. The outcome of this plot was a pattern of curves of a similar shape to those of biological growth and decay processes.

On the basis of this preliminary pattern, Jaques put forward the tentative view that there might be a regular pattern of progression in the development of the capacity to exercise discretion. He also suggested the possibility that people exert a strong force towards obtaining work at a level which allows a time scale of review consistent with the scope of their capacity.

Thinking in these terms led to the idea that, if individuals were not receiving payment that they felt was fair for the level of work they were capable of carrying, they would show signs of disequilibrium. This suggested that the relationship between payment (and progress in payment) and capacity (and progress in capacity) could be studied in its own right.

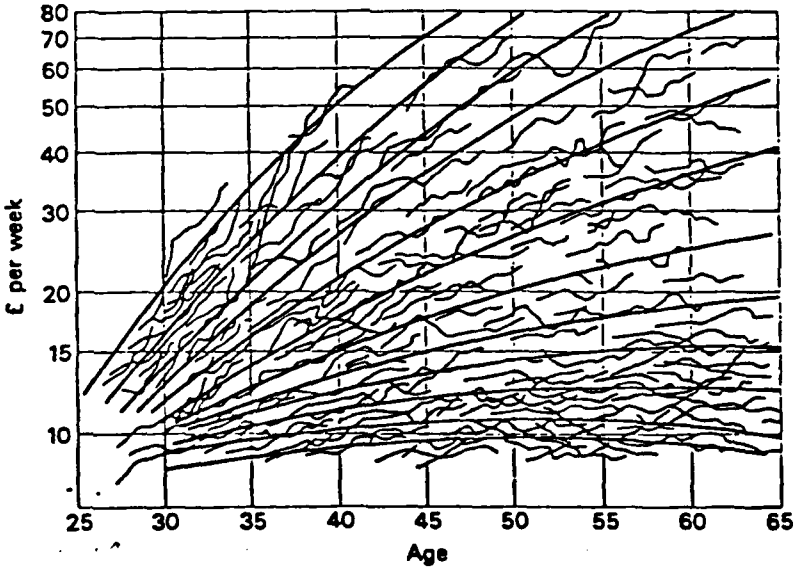
(vii) Progress in Payment and in Capacity

The ideas about disequilibrium and progress in payment and capacity were tested with a group of shop-stewards who had been prevented by the demands of their representative work from achieving their proper career progression. Before starting the study, it was noted that the possible solutions already considered by the company reflected the implicit assumption that each person is motivated towards maintaining an equilibrium between his or her capacity, work and payment and, further, that capacity is not fixed but that it continues to mature. The study was conducted by arranging confidential interviews with each of the shop-stewards; in the course of these interviews it became clear that

each person had an intuitive sense of the relationship between their level of work (measured in time-span) and their own capacity. They could readily give examples of times when they had been overstretched or underused and of times when there had been a match between their capacity and the work for which they were responsible.

They responded to fluctuations in pay with the same sense of what constituted balance and what did not. Examination of the actual earning progression of each individual shop-steward showed that he reacted to upward and downward movements in his earnings as though they were movements towards or away from some inner personal standard which constituted an expected or desired progress for himself. From this data it became clear that a smoothed curve could be drawn that represented the equilibrium for each individual.

Table II : Earning Progression Curves



(viii) From the Earning Progression to the Capacity Growth Curves

This experience led Jaques to the conclusion that there might possibly be a smoothed curve of progression in earnings for each person which coincided with the development of their capacity and, hence, represented an equilibrium with regard to earnings progression. It seemed likely that these individual equilibrium curves might order themselves into a continuous family of curves.

In order to test these assumptions, Jaques decided to plot the actual earnings over time of a number of individuals. In Equitable Payment (1967) he reports on the plotting of the earnings of two hundred and fifty people in five different companies and, in an appendix, on similar plotting from seven companies in the United States of America.

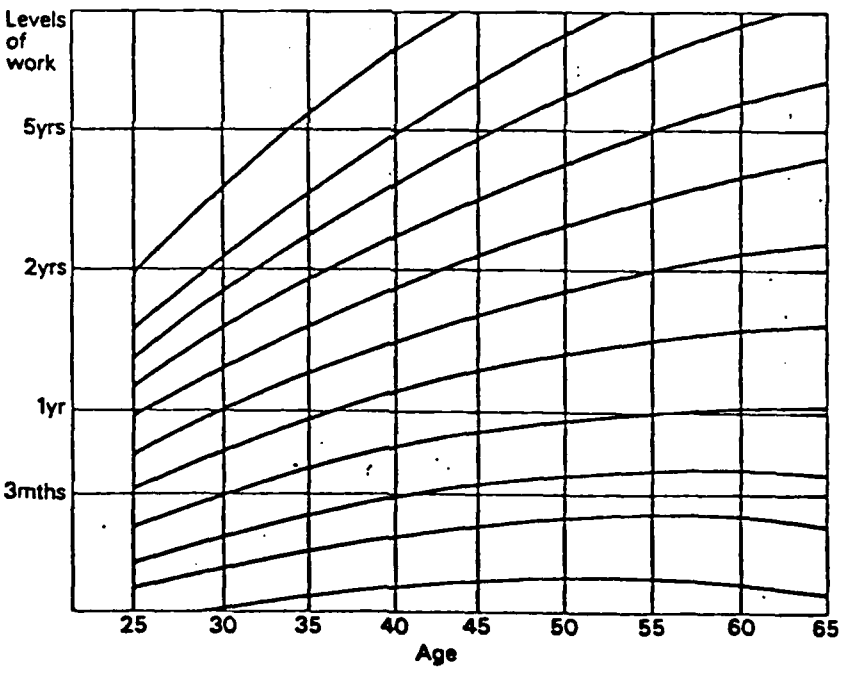
In order to present the data as clearly as possible (see Table II) it was plotted on semi-log graph paper in which age is represented on the horizontal axis using an arithmetic scale. The vertical axis is more complicated (see Evans, 1979, p 104). It is scaled in two forms - time-span and earnings - using the equivalence between them which is derived from the correlations mentioned above and which is called 'the equitable work payment scale'.

The earnings scale is logarithmic and this has two main advantages. First, we think of payment changes not in absolute but in proportionate terms, so that plotting the pay information in terms of these 'equal sense distance' proportions, as represented on a log scale, immediately heightens appreciation of its significance. For graphing progressions, a further useful consequence of using a log scale is that a progression which maintains a steady year-by-year climb of, for example, 12½%, appears on the chart as a steady incline. The same constant rate of progress on an ordinary arithmetic scale would have to be presented as an even steeper climb because of its cumulative 'compound interest' effects. This would be confusing because one would have mentally to reconvert the picture back into constant proportion terms in order to get the sense of what the graph is really saying about the person's

progress. The log scale simply does this conversion and does it more accurately.

Through the population of individual earning progressions Jaques drew a number of smoothed continuous curves which represented to him the general trend of movement of the individual curves (see Table III). These curves followed the sigmoidal progression characteristic of biological growth. Following the hypothesis that progression of earnings coincided with the development of the capacity to exercise discretion, these curves were called Capacity Growth Curves and they are illustrated in Table III below.

Table III : The Capacity Growth Curves



As Evans points out (Evans, 1979, p 102), the surprise in these early pilot studies - surprising only because it fails to take notice of

conventional economic and motivational theories which supposedly govern earnings - was the consistent finding that payment progressions tend to reflect an underlying primary drive associated with individual capacity growth. For, with few exceptions, the ups and downs in each person's actual payment history simply 'snaked' around his capacity equilibrium career path, as if seeking to maintain this trend. This observation suggested that further studies by interview - which were inevitably slow and yielded only small amounts of piecemeal data - were no longer necessary. Provided deviations between actual and equilibrium progressions were small and self-cancelling, statistical time-series analysis could be relied on to iron out the crinkles from the actual pay progressions, thus extracting smooth trends in capacity paths.

Thus, even without the equivalent capacity data, if individual payment histories were assembled in quantity and their career path trends statistically generalised against age, the result should approximate to the underlying field of capacity growth parameters - the equilibrium career paths - expressed in pay progression terms.

The first twelve years of Jaques' work are summarised in Progression Handbook (1968) which explains the relationship between the earning progression curves and the capacity growth curves. The first point is that the former are statistical facts about pay; the latter represent an hypothesis about growth in the capacity to exercise discretion. The two main sources of the hypothesis are:

(i) The plotting of actual earning progressions of some thousands of individuals between twenty and sixty-five years of age, corrected for movements in the wages index or its equivalent. These plots, carried out with data from twenty-one countries, reveal a general pattern of progression.

(ii) Data on the career development of some seventy-five individuals, measured both in time-span of level of work and in earnings, followed at first hand over periods of five to fifteen years. In addition there is

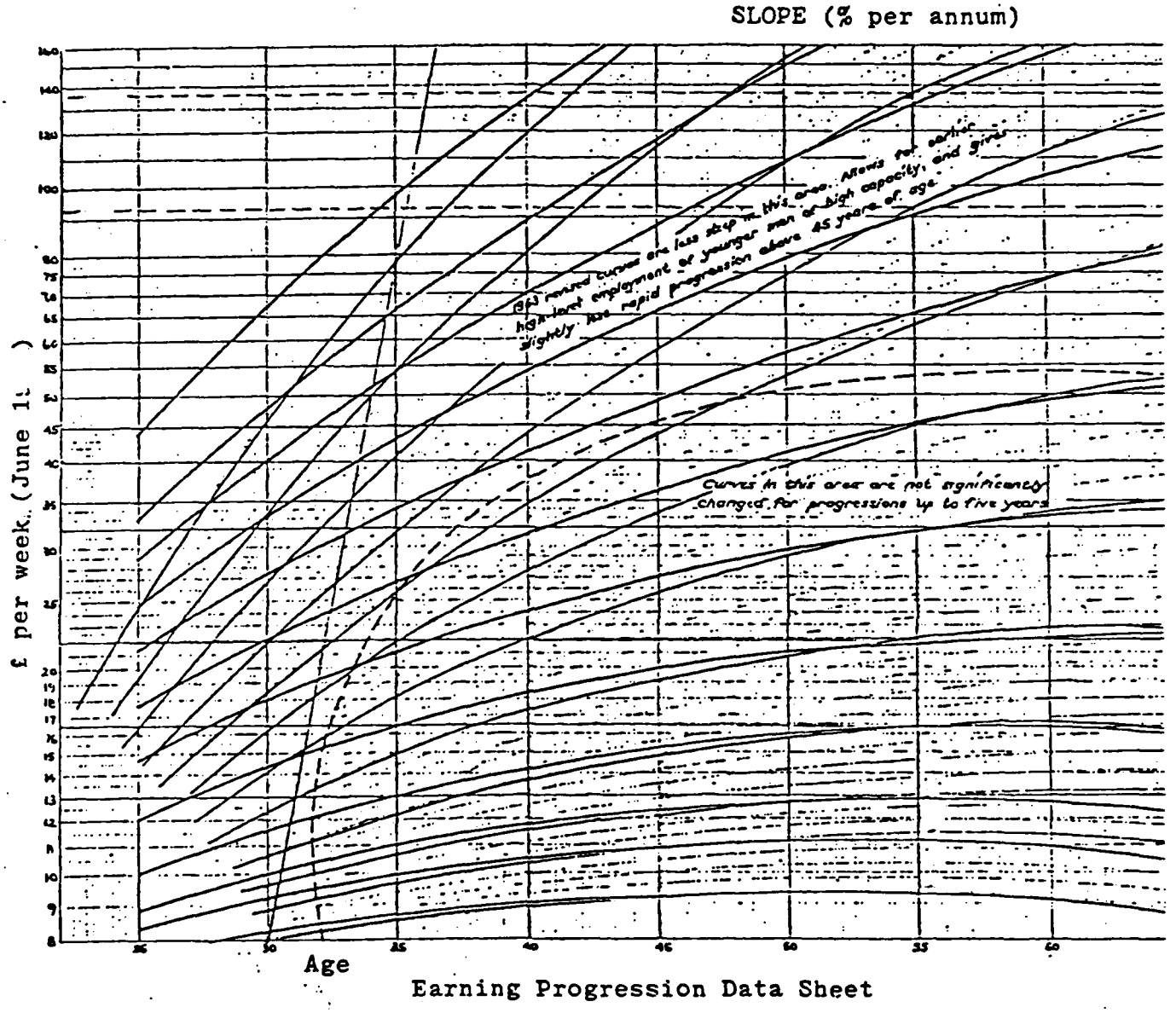
information about the person's view of the fit of his or her work to their capacity and their manager's evaluation of performance.

The difference in slope between the original earning progression curves and the capacity growth curves is explained by comparing the general patterns. Comparison shows that the earning progression curves are rather steeper, especially towards the younger age/higher capacity area. Jaques departed from these steeper earning progressions in constructing the capacity growth curves because the data on career development suggested that younger/ higher capacity people were less likely to be employed at their full capacity in industry.

The original family of earning progression curves was constructed from data which did not include any earning progressions for individuals under the age of thirty, or paid above the equitable payment level for five years time-span; that is to say, the younger age group and the higher capacity group were missing.

In the event, Jaques felt that experience with the original family of curves had shown the capacity curves to be too steep for the younger age group and the higher capacity group. His accumulating data, based on repeated assessments of the performance and capacity level of the same individual through time, indicated that the growth of capacity was rather flatter than had been assumed. Accordingly, he modified the capacity growth curves in 1963. The comparison between the original earning progression curves and the 1963 revision is illustrated in Table IV overleaf.

Table IV : Comparison Between Original Earnings Progression Data Sheet and the 1963 Revision

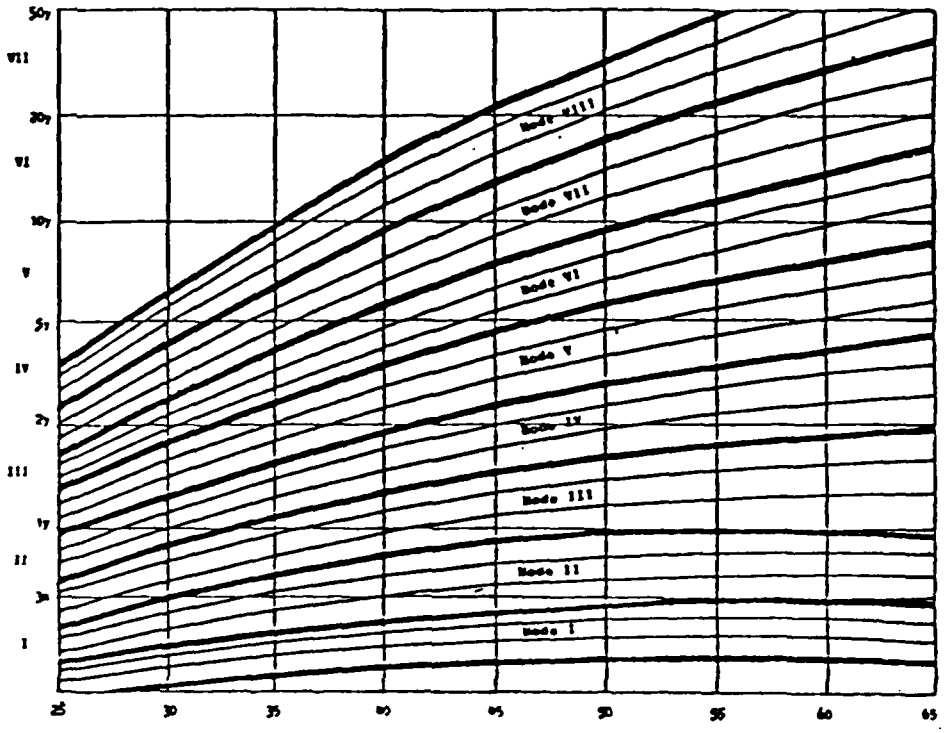


By the time 'A General Theory of Bureaucracy' was published in 1976, earning progression data had been plotted by Jaques and colleagues on two hundred and fifty thousand people from twenty countries. As one outcome of the earning progression studies, he had learned that, if you ask any employed person what he or she feels would be a fair and just total compensation for a job that they would consider exactly right for their current capabilities, they will name a figure, say X1. If you then ask them to think of a job that would be just right for them in, say, five years time, and to consider what total emolument (under constant economic conditions) he or she would anticipate as fair and just at the time, their reply - X2 - will fall within plus or minus 3% of the figure derived from extrapolating the curve on which X1 fell.

In addition to the data on earning progressions, Jaques also had material on career development for more than one hundred people extending over five to eighteen years. By this stage he had concluded that, once the high mark at any given point in a person's career is established, (that is to say, a time-span of work at which he or she felt they were working at absolutely full stretch), that high mark appeared to have good predictive value for high marks in their subsequent career.

In 1961 Jaques summarised the array of progression curves into eight modes to reflect the hypothesis that capacity is multi-modally distributed and that the boundaries between capacity groups represent complete discontinuities. The curves were grouped into modes such that all curves which reach a maximum point of development in the same level of work are in the same mode. This modal grouping is illustrated in Table V overleaf.

Table V : Chart of Working Modes



c) Tests of Time-Span, Felt Fair Pay, Organization Strata and the Slope of the Progression Curves

As stated above, there have been a number of tests of the interrelationships between the three fundamental variables of level of work (measured in time-span), pay (and progress in pay), and capacity (and growth in capacity). A brief summary of five studies is given below.

1 The Wijnberg Study, (1965)

Wijnberg made a contribution to establishing the validity of the progression curves in a series of researches carried out for the Netherlands General Employers Association in 1965. His basic hypothesis was that, under certain conditions, the equitable work payment scale which relates the time-span of a piece of work to the corresponding felt fair compensation, also describes the relationship between actual pay and the capacity to exercise discretion. These conditions are fulfilled only when an economy affords abundant employment, encouraging and enabling people to select for themselves work which uses their capabilities to the full and offers matching rewards. At the time of the study Holland was a good example of a full employment economy.

Wijnberg assembled the cumulative income distribution for the total Dutch employed labour force (including manual, technical, clerical and professional personnel) adding to it data on part of the labour force in Britain. He then derived the corresponding cumulative distribution of capacity. Reduction into the frequence density form yielded a near normal distribution symmetrical about a mean time-span value of two weeks. As such a distribution was very much in line with the independently based expectations, Wijnberg's original hypothesis was upheld.

For a further test, Wijnberg used the equitable work payment scale to derive income curves corresponding to the capacity growth curves after

first expressing these curves in the form of polynomial approximations. When the curves were superimposed on a scattergram of the annual incomes of some five hundred monthly paid staff, aged twenty-five to sixty in eight enterprises, the computed family of income curves gave an excellent fit. None of the data points deviated by more than 5% from the nearest curve.

2 The Homa Study. (1967)

In 1967 Homa published an extensive series of investigations in which she interviewed one hundred and seventy-nine subjects in five private companies and the Federal Civil Service in the Boston area.

Her initial hypothesis was that individuals engaged in employment work can make an intuitive judgement about their level of capacity at any given time and can express it in financial terms; that is to say, in terms of the felt fair pay for a level of work that would be consistent with their deployable level of capacity at that time.

Having this intuitive judgement, people can judge whether or not a job is suited to their current capacity. Moreover, people also have an intuitive judgement of the pattern of growth of their capacity, and can express that in terms of felt fair pay in the future. Homa asked each subject two main questions: first, his current sense of fair pay for a level of work that would be just right for him; and, second, his sense of fair pay under assumed constant economic conditions for a level of work that he thought would be just right in five years time.

Her data led her to the revised hypothesis that people do have an intuitive awareness of their level of capacity at any given time and that they can express this in financial terms. People also have an intuitive awareness of the rate of growth of their capacity and can express that in financial terms. But, as applied to the future, financial terms are not a means satisfactory enough for predicting their rate of capacity growth.

Homa had intended to derive an array of curves from her data but, for technical reasons, was unable to do so. As an alternative she compared her data with the array of progression curves. Visual inspection demonstrated similarity between her data and the curves. She made a further comparison with the pattern of curves derived from a 1964 survey of salaries by the National Science Laboratory in Los Alamos. Her conclusion was that the pattern assumed to be growth in the capacity to exercise discretion appeared to manifest itself in similar form in each of these three arrays.

3. The Richardson Study. (1971)

In 1971 R. Richardson undertook a study of time-span and felt fair pay in the Honeywell Corporation. This study was concerned not with the hypothesis represented by the progression curves but with the relationship between time-span of discretion and felt fair pay.

Richardson asked two questions about the relationship between time-span of discretion as measured by the manager and felt fair pay as perceived by the subordinate. The first was 'is the relationship between time-span of discretion and felt fair pay as high as Jaques claims?' The second, 'if so, what extraneous variables can explain this relationship?'

The population from which Richardson's sample was drawn encompassed three hundred and sixty middle managers working in three divisions. He developed a series of specific questions which forced the interviewer to follow a prescribed interviewing format. Richardson's first hypothesis that there is a direct, linear relationship between time-span of discretion as measured by the manager and felt fair pay as perceived by the subordinate was upheld - 'a direct, linear relationship was found to obtain between time-span of discretion and felt fair pay'.The second question was what variables might exist that could explain the relationship between time-span of discretion and felt fair pay. Richardson constructed two possible explanations; one seeking to explain the relationship by employing variables intrinsic to the

manager/subordinate interaction and the other concerning variables related but extrinsic to that relationship. None of the variables set up to account for the relationship actually did so and Richardson's major conclusion is that time-span of discretion and felt fair pay measure the same phenomenon (level of work) on qualitatively different dimensions (time and money).

4 The Nystrom Study, (1973)

In 1973 P.C. Nystrom used a computer simulation to convert Jaques' theory of equitable payment into the composite model utilized by the Haire, Ghiselli and Gordon study of career pay. Salaries of one hundred subjects were stochastically allocated for twenty-five time periods. A Markovian process model produced a set of pay parameters that more closely replicated past empirical findings than the parameters produced by an independent process model. Distributing pay increases according to differentially developing work capacity curves yielded pay increases distributed at random with respect to past salaries.

The general finding of this study was that allocation of salaries in a manner consistent with Jaques' data and theory of equitable payment produces career pay curves similar to those reported in the Haire study. Nystrom pointed out that, whereas the Haire study was a major empirical work describing how pay is distributed over time, Jaques' theory provides an explanation of the psychological consequences. According to the theory of equitable payment, payment consistent with work capacity contributes to a psychologically desirable state of equilibrium. Nystrom concluded that "the portion of Jaques' theory of equitable payment concerning longitudinal development of work capacity, provides one plausible explanation for some heretofore perplexing career pay parameters."

5 The Kohler Study. (1982)

In 1982 Kohler analysed data on fifty-two male employees which had been collected by Jaques over forty years. Each man had, on one or a number of occasions, given an answer to the question "What would be your annual earnings if you were now in a work role that used your capacity to the full and for which you were fairly paid?"

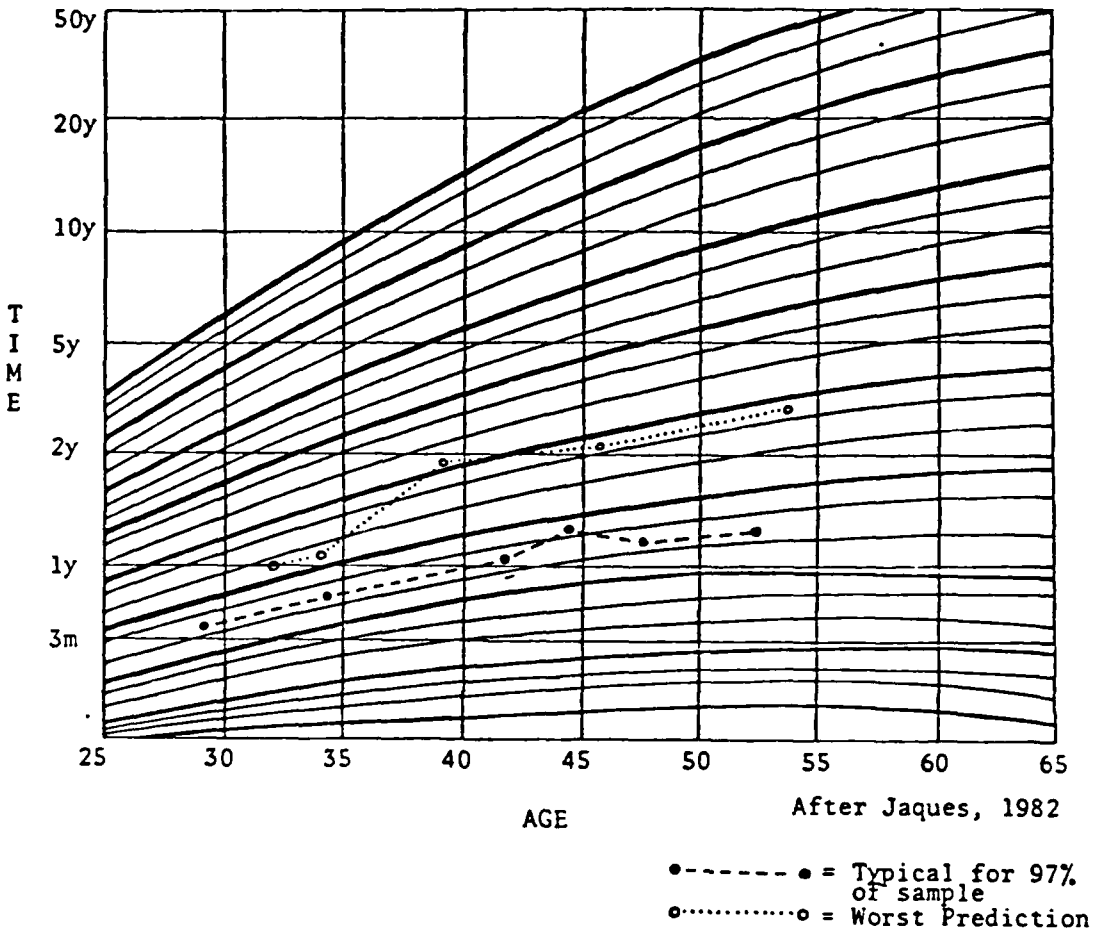
Kohler described each answer to this question as a 'time frame comfort index' (TFCI). Connecting several TFCIs for any one person produced a time frame comfort curve (TFCC) . The average age of the sample when they first became involved in the study was thirty. The time between first and last TFCIs ranged from eight to thirty-six years.

The key question for the analysis was whether several TFCIs from one person over many years do actually follow a capacity growth curve i.e. whether the time frame comfort curve of an individual would conform to a capacity growth curve and, more generally, whether an array of time frame comfort curves would conform to the capacity growth array.

In addition to this question of conformance, the study also determined (i) whether the growth curves were better predictors in the early, middle or later adult years and (ii) whether predictions were better when an individual's TFCIs were close together in years. In 97% of the cases, the successive TFCIs fell in the area immediately surrounding the predicted growth curve. In 3% of the cases the time frame comfort indices touched the distance of two growth curves beyond the predicted growth curve. Time frame comfort curves conformed closely to capacity growth curve curves.

Table VI overleaf illustrates the typical fit of TFCIs to a capacity growth curve and the worst fit in the total sample.

Table VI : Time Frame Progression Array with Typical & Worst Prediction



In view of the possibility that TFCIs could have ranged all over the matrix in Table VII, these findings are very significant. A confirmation rate of 97% was obtained on TFCIs stretching over eight hundred and thirty-one years for the aggregated sample. During this time one hundred and fifty-one TFCIs had been made. Only three of these were insignificantly discrepant with predictions. There was no tendency for the confirmation of predictions to vary by age groups, and predictions were not affected by the number of years between TFCIs.

Other relevant longitudinal data which had been collected included; actual pay, actual work (in time-span terms) and job satisfaction ratings. 95% of the time, those subjects who reported job dissatisfaction did so when their work level or actual pay was inconsistent with their time frame comfort curve. They reported job satisfaction when their work level or actual pay was consistent with their time frame curve.

Kohler's analysis of the longitudinal charting of the reported time frame comfort of individuals is a further confirmation of the differential slopes of the pattern of progression curves and the hypothesis about differential rates in the growth of capacity which they represent. Here it is as well to recall the point made earlier that the array presents statistical facts about pay and represents an hypothesis about growth in capacity.

Both the Homa and the Kohler studies strengthen that hypothesis, using self report of current capacity expressed in financial terms to check the slope of the curves. The overall conclusion that can be drawn from these tests of the inter-relationship between the three fundamental variables of level of work (measured in time-span), pay (and progress in pay), and capacity (and growth in capacity) is that SST provides a coherent model for understanding work, the way it is organised and people's experience of it. In addition, it offers a considerable body of evidence which suggests that the capacity to exercise discretion grows over time at different but broadly predictable rates.

To return to the overall conclusion of the studies cited at the beginning of this paper, SST offers a theory which is needed if present validity coefficients for predicting potential are to be increased. In its definition of work and its capacity to measure work at different levels, it provides a common content domain for predictors of that capacity in people which will allow them to do work viz the exercise of discretion, and for criteria which will be used to judge the success of those predictors viz levels of work. It also offers an array of curves which will allow accurate prediction of the rate at which that capacity will grow.

Career Path Appreciation

a) The Background.

The third section of this paper describes the development and testing of a procedure for predicting growth in the capacity to carry responsibility for work. In order to understand the procedure and the follow-up data presented, it will be necessary to look briefly at the fourteen years of work which lie behind it.

My starting point was a theory which (i) defined work, (ii) offered precise descriptions of seven levels of work of increasing complexity and - in time-span - a tool for measuring them; (iii) offered a clear description of the capacity to exercise discretion, and (iv) an array of progression curves indicating rates of growth in that capacity. The theory, therefore, provided a common content domain for predictors and criteria and a definition of the psychological experience of work which allowed for work sampling in a very particular sense.

The definition stated that the core of the psychological experience of doing work is the exercise of discretion. By using the word "exercise" we exclude those judgements which are thought through but not acted on. The exercise of discretion involves mulling over a number of courses of possible action, reaching into the self to choose those (or the one) which will realise the purpose in hand and acting on that choice. In short, we are looking at realisation - the use of discretion in actually doing something.

b) The Original Procedure: the Symbol Card Task.

Starting from the idea that, from a psychological perspective, work is discretion realised in action, we decided to design a procedure which would allow us to observe the person at work. This was work sampling not in the concrete sense of watching a person doing a task but in the psychological sense of observing how judgements were realised in actions. Because we wanted to set up a microcosm of the psychological

experience of doing work, we decided not to use general tests of ability. While these might predict thought processes, they were less likely to be good predictors of realisation in practice.

In parallel with Jaques' early work Isaac and O'Connor had been studying complexity of strategies in action. Building on their work (Isaac and O'Connor 1969, 1973), we decided to start by using a task which came originally from the concept formation literature (see Bruner, 1966). Because we were not trying to measure learning abilities but to observe strategies in action we decided to give only minimal instructions to the respondent and not to offer rehearsal.

The task consisted of working out the pre-set order of a set of 170 cards with symbols varying in colour, number, size and shape. Four display cards were set out and the respondent asked to sort the pack. In the case of three of the display cards, the respondent was told whether or not their placement corresponded with the pre-set order; in the case of the fourth card, they were given no information.

At the end of this task we had a very brief discussion with the respondent about their current work, the history of their career and their aspirations for the future.

With this procedure it appeared to be possible to elicit enough information about the respondents' characteristic patterns of realising discretion in action to make a judgement about the level of work at which they would currently be effective. In the very early stages of the work this judgement was checked against the level of work at which they were actually employed. Although no formal correlations were made, the degree of correspondence was deemed satisfactory.

c) The Phrase Cards.

In the course of analysing the interview material and, in particular, respondent's comments about the way they had constructed and tested strategies, it became clear that a further important source of

information about characteristic patterns of realising discretion lay in these comments.

Out of more than a hundred phrases taken from protocols of the symbol card task, fifty-four were chosen for the final pack of phrase cards. They were chosen because , in the course of testing the hundred, these emerged as the phrases which consistently elicited the fullest discussions about the way the respondent approached his or her work. The fifty-four were arranged in nine sets of six and added to the procedure by giving them to the respondent before the symbol card task.

The respondent is offered each set separately and asked to choose the one which s/he feels reflects most closely the way s/he would approach a piece of work. Respondents frequently comment on more than one card, or may choose to put the cards in some order or to put aside those which they feel do not relate in any way to their own approach to work.

The added understanding of the respondent's patterns of realising discretion afforded by these phrase cards, and the evident reflective enjoyment and insight they gave, warranted their inclusion in the procedure. There is no attempt to score respondents' comments; they are analysed for content in the light of the model of levels of work of varying complexity.

During the same period it became clear that more information would be available to the administrator (and to the respondent) if the career interview was more structured. We therefore decided to ask the respondent to talk about times when s/he felt that there had been a good correspondence between their own capacity to exercise discretion and the work for which they were responsible, times when they felt they had been overstretched and times when they felt they had been underused.

d)The Refined Procedure.

The phrase cards and the more structured interview were added to the original procedure in 1979. By 1982 the procedure had been named Career

Path Appreciation (CPA) and could best be described as an intensive interview - "a guided conversation which seeks to elicit materials of substantial depth for use in qualitative analysis" (see Lofland and Lofland, 1982).

e) The Predictors.

Running alongside the refinement of the procedure was a deepening of my early understanding of the concept of discretion.

In the essays collected in Work, Creativity and Social Justice, Jaques describes discretion as a sphere of psychological activity which, although familiar, remains conceptually ill-defined. There is no satisfactory, commonly-employed language for it. We speak about judgement, intuition, nous, skill, experience, know-how, common sense, discretion, discrimination, hunch, and, more crudely, 'using your loaf', guesstimating. The sensation for the person is one of uncertainty, of worry.

We cannot put into words what it is that we are taking into account in doing what we are doing, and, in that sense we do not know that what we are doing will get us where we want to go, will achieve the result we want to achieve. We judge that it will, we think it will but we are not sure and only time will tell. The mental processes involved in work are unconscious. They are, therefore, unverbalisable and cannot be taught by direct formulated communication. It is the kind of experience normally communicated by apprenticeship - "watch what I do and try to get the feel of it", "I wouldn't have done it that way, I would have done it this way".

My understanding of these comments about discretion was considerably enhanced by the experience of offering Appreciations to many hundreds of people. Two common threads run through many hours of listening to accounts of working lives and watching people as they gave them.

When someone wanted to speak about the subtle process of realising discretion in actions, s/he frequently had recourse to the idea of common sense - "When all the information is in and analysed, that is when I use my common sense; my gut feel about the way we should go". For added emphasis these comments were - without exception - accompanied by a gesture of the hand or hands towards the centre of the respondent's body. It appeared that these gestures were meant to convey a reaching into the depths of the self for the feel of what was to be done.

The second thread running through these conversations is the assumption that everyone knows what is meant by "common sense" and that it is a socially acceptable "cover up" or rationalisation for what is more commonly described as "gut feel", as intuition, or as "what you do when you don't know what to do."

As I came to a deeper understanding of the exercise of discretion, I was able to mould the Appreciation more sensitively to this experience within the person. In that sense the exercise of discretion became the prime predictor of the scope of the field of work with which the person would be comfortable at the time of the Appreciation. The array of capacity growth curves were then used to predict the pace of growth of the capacity to exercise discretion in fields of increasing complexity.

The results of the first fourteen years' experience with the use of Career Path Appreciation, are presented in the ARI Report "Assessment of Managerial Potential: Longitudinal Research", February, 1988.

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